

DONALD A. BENDER, PH.D., P.E.

Professor, Department of Civil and Environmental Engineering
Director, Wood Materials and Engineering Laboratory
Washington State University
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TECHNICAL INTERESTS:

Engineering analysis and design of timber structures. Laboratory testing and analysis of products such as decks, rails, trusses, wall and floor systems, lumber, ladders, scaffolding, and connectors (e.g. nails and bolts).

EXPERIENCE:

Weyerhaeuser Distinguished Professor of Civil Engineering (5/97-present), Dept. of Civil and Environmental Engineering, Washington State University, Pullman, WA.

Director (5/97-present), Wood Materials and Engineering Laboratory, Washington State University, Pullman, WA.

Affiliate Professor (9/02 - present), Dept. of Biological Systems Engineering, Washington State University, Pullman, WA.

Affiliate Professor (1/02 - present), Dept. of Forest Products, University of Idaho, Moscow, ID.

Professor (9/94 - 5/97), Agricultural Engineering Dept., Texas A&M University, College Station, TX.

Interim Department Head (1/93 - 1/94), Agricultural Engineering Dept., Texas A&M University, College Station, TX.

Associate Professor (9/89 - 8/94), Agricultural Engineering Dept., Texas A&M University, College Station, TX.

Assistant Professor (2/84 - 8/89), Agricultural Engineering Dept., Texas A&M University, College Station, TX.

Visiting Scientist (9/91 - 5/92), Engineering Properties of Wood Department, USDA Forest Products Laboratory, Madison, WI.

EDUCATION:

Ph.D. Agricultural Engineering, Purdue University, 1984

M.S. Agricultural Engineering, Virginia Polytechnic Institute and State University, 1980

B.S. Agricultural Engineering, Virginia Polytechnic Institute and State University, 1979

PROFESSIONAL LICENSE:

Registered Professional Engineer: Texas #60964

PROFESSIONAL MEMBERSHIPS:

American Society of Civil Engineers (ASCE)

American Society of Agricultural Engineers (ASAE)

American Society for Testing and Materials (ASTM)

Forest Products Society (FPS)

Society of Wood Science and Technology (SWST)

HONORS AND AWARDS:

Weyerhaeuser Distinguished Professor of Civil Engineering, Washington State University, 1997-present

Leon Luck Faculty Award. 2007. Department of Civil & Environmental Engineering, Washington State University.

Outstanding Teaching Faculty Award. 2002. College of Engineering and Architecture, Washington State University

Five national-level journal article awards from SWST, FPS and ASAE

Bernon G. Perkins Award, National Frame Builders Association, 1997

Rural Builder Hall of Fame, Rural Builder Magazine, 1995

Award for Excellence in Team Research, Texas A&M University System, 1989

Honor Societies: Sigma Xi, Tau Beta Pi, Alpha Epsilon, Alpha Zeta, Gamma Sigma Delta

SELECTED COURSES TAUGHT

Undergraduate Courses

Design of Timber Structures

Dynamics

Computer Simulation

Environmental Design of Structures

Materials & Design of Structures

Graduate Courses

Advanced Timber Engineering

Probability and Statistical Models in Engineering

Statistical Modeling & Simulation of Biosystems

Graduate Seminar

Short Courses to Practicing Professionals

Structural Design with Wood, 2003-present

Post-Frame Building Design, 1990-1999

Structural Wood Products and Wood Preservation, 1995.

SELECTED RESEARCH PROJECTS AND GRANTS:

Innovative foundation system for light-framed wood construction. DeVlieg Foundation, 2008.

Foundation elements for naval low-rise buildings. Office of Naval Research, 2006-2008.

Composite material alternatives to timber in the construction of wing walls. Washington State Dept. of Transportation. 2005-2007.

Inland Northwest Forest Products Research Consortium. USDA Wood Utilization Research Program. 1999-2007.

Naval Advanced Wood Composites – Nondestructive Evaluation Methods. U.S. Navy, 2001-03.

Engineered Wood Composites for Naval Waterfront Facilities – Nondestructive Evaluation Techniques and Connector Performance. U.S. Navy, 1997-2001.

Composite Reinforcement of Wood Baseball Bats. Washington Technology Center. 1998-2000.

Creep testing of Wood Plastic Composites. TMI, 1997-98.

Development of Ultrasonic Techniques for Assessing Damage and Load Sharing Among Fasteners in Timber Connections. U.S. Forest Products Laboratory, 1994-96.

Probabilistic Characterization of Nailed Connections. USDA Competitive Grant, 1994-96.

Ring-shank Nail Performance in Southern Pine Lumber. International Paper, Inc., 1995

Ultrasonic scanner for Grading Southern Pine Lumber. Temple-Inland Forest Products Co., 1994.

Nondestructive Evaluation of End-jointed Lumber. American Institute of Timber Construction, 1994.

Characterization of Southern Pine Material Properties. American Institute of Timber Construction, 1992-94.

Advanced Stress Rating System Suitable for Small Lumber Mills. USDA Competitive Grant, 1992-94.

Ultrasonic Evaluation of Wood Composites. Texas Advanced Technology Program. 1993-95.

Nondestructive Evaluation of Biological Materials for Product Quality and Process Enhancement. Research Enhancement Program, Texas Agricultural Experiment Station, 1993-95.

Reliability Assessment of Structural Wood Products and Systems. McIntire-Stennis project, 1990-94.

Validating NDE of Finger Joint Performance. USDA Forest Products Laboratory, 1991-92.

Neural Networks for Enhanced Machine Stress Grading of Lumber. USDA Forest Products Lab., 1991-92.

Enhanced Tensile Strength Prediction Using MOE-Map Information. Weyerhaeuser, 1991.

PROLAM - A Probabilistic Glulam Timber Beam Model. Amer. Inst. of Timber Construction, 1989-91.

Statistical Characterization of E-Rated Laminating Lumber. Amer. Inst. of Timber Construction. 1988-89.

Performance of E-Rated Douglas Fir End Jointed Lumber. Frank Lumber Company, 1987.

Statistical Characterization of Lumber for Glued-Laminated Beams. USDA Competitive Grant, 1985-88.

Load Rate Effects for Tension Proof Loaded Lumber. Lumbermate Company, St. Louis, MO. 1985.

SELECTED PUBLICATIONS

(* *Indicates former graduate student of Dr. Bender's*)

- Graham*, D.A., D.M. Carradine, D.A. Bender and J.D. Dolan. 2008. Performance of log shear walls subjected to monotonic and reverse-cyclic loading. ASCE Journal of Structural Engineering (in review).
- Graham*, D.A., D.M. Carradine, D.A. Bender and J.D. Dolan. 2008. Monotonic and reverse-cyclic loading of lag screw connections for log shear wall construction. ASCE Journal of Materials in Civil Engineering (accepted).
- Schildmeyer, A.J., M.P. Wolcott and D.A. Bender. 2008. Experimental Investigation of the Temperature-Dependent Mechanical Behavior of a Polypropylene-Pine Composite. ASCE Journal of Materials in Civil Engineering (accepted).
- Carradine, D.M., D.A. Bender, F.E. Woeste and J.R. Loferski. 2007. Development of design capacities for residential deck ledger connections. Forest Products Journal 57(3):29-33.
- Schwab*, S.C., D.A. Bender, D.M. Carradine and F.E. Woeste. 2007. Tensile strength of oriented strandboard as affected by specimen width. Forest Products Journal 57(6):39-45.
- Bender, D.A., D.S. Gromala and D.V. Rosowsky (Eds.). 2006. Proceedings of the 9th World Conference on Timber Engineering, Portland, OR, August 6-10. 421 p.

- Bender, D.A., M.P. Wolcott and J.D. Dolan. 2006. Structural design and applications with wood-plastic composites. *Wood Design Focus – A Journal of Contemporary Wood Engineering* 16(3):13-15.
- Carradine, D.M., D.A. Bender, J.R. Loferski and F.E. Woeste. 2006. Residential deck ledger connection testing and design. *Wood Design Focus – A Journal of Contemporary Wood Engineering* 16(2):9-12.
- Graham*, D.A., D.M. Carradine, D.A. Bender and J.D. Dolan. 2006. Lateral loading characteristics of connections in log shear walls. *Proceedings of the World Conference on Timber Engineering, Portland, p. 170, August 7-10.*
- Tichy, R. and D.A. Bender. 2006. Wood/natural fiber-plastic composite decking products. *Wood Design Focus – A Journal of Contemporary Wood Engineering* 16(2):19-21.
- Bender, D.A. and J.D. Dolan. 2005. Engineered applications of wpc's - beyond deck boards. *Proceedings of 39th International Wood Composite Materials Symposium, Pullman, WA, pp. 295-299.*
- Carradine, D.M., D.A. Bender, J.R. Loferski and F.E. Woeste. 2005. Residential deck ledger design. *ICC Building Safety Journal* (3)6:4-7.
- Lebow, S., J. Winandy and D.A. Bender. 2004. Treated wood in transition: a look at CCA and the candidates to replace it. *Wood Design Focus* 14(2):3-8.
- Parsons*, W.R. and D.A. Bender. 2004. Energy-based design of dowel connections in wood-plastic composites hollow sections. *ASCE Journal of Structural Engineering* 130(4):681-689.
- Bender, D.A. and M.P. Wolcott. 2003. Experiences with development and commercialization of engineered wood-plastic composites. *Proceedings of the 7th International Conference on Woodfiber-Plastic Composites, pp. 15-19, Madison, WI, May 19-20.*
- Tucker*, B.J. and D.A. Bender. 2003. Continuous ultrasonic inspection of extruded wood-plastic composites. *Forest Products Journal* 53(6):27-32.
- Tucker*, B.J., D.A. Bender, D.G. Pollock and M.P. Wolcott. 2003. Ultrasonic plate wave evaluation of natural fiber composite panels. *Wood and Fiber Science* 35(2):266-281.
- Shrestha, D., D.A. Bender and F.E. Woeste. 2003. T-brace design for MPC wood truss webs. *Forest Products Journal* 53(1):61-69.
- Tichy, R, D.A. Bender and F.E. Woeste. 2003. Wood-plastic composite decks. *ICC Building Safety Journal* 1(4):38-40.
- Anderson, C., D.A. Bender and F.E. Woeste. 2002. Checking T-Brace capacity on wood truss webs. *ICBO Building Standards* 71(6):5-10.
- Anderson, C., F.E. Woeste and D.A. Bender. 2002. Substituting T-Braces for continuous lateral braces on wood truss webs. *Frame Building News* 14(3):36-40.
- Peters*, J.J, D.A. Bender, M.P. Wolcott and J.D. Johnson. 2002. Selected properties of hybrid poplar clear wood and composite panels. *Forest Products Journal* 52(5):45-54.
- Pollock, D.G and D.A. Bender. 2001. Reliability indices for bolted and nailed connections in wood structures. *Proceedings of the ASCE Structures Congress, Washington, D.C.*
- Pollock*, D.G., D.A. Bender, D.E. Bray and J.T.P. Yao. 2001. Ultrasonic detection of a plastic hinge in bolted timber connections. *Materials Evaluation* 59(5):625-631.
- Rammer, D.G., S.G. Winistorfer and D.A. Bender. 2001. Withdrawal strength of threaded nails. *ASCE Journal of Structural Engineering* 127(4):442-449.
- Woeste, F. E. and D.A. Bender. 2001. Shrinkage of framing lumber. *ICBO Building Standards* 70(6): 10-13.

- Wolcott, M.P., R.J. Tichy, and D.A. Bender (Eds.). 2000. 34nd International Particleboard/Composite Materials Symposium Proceedings, Washington State University, Pullman, WA. 208 p.
- Smith, L.V., J.C. Hermanson, S. Rangaraj, and D.A. Bender. 1999. A dynamic finite element analysis of wood baseball bats. Proc. ASME Summer Bioengineering Conference, Big Sky, Montana, June 16-20.
- Tucker*, B.J., D.A. Bender and M.P. Wolcott. 1999. Predicting flexural strength of wood-plastic composites using nondestructive evaluation. Proc. Society of Experimental Mechanics Annual Conference, Cincinnati, OH, June 7-9, 1999.
- Wolcott, M.P., R.J. Tichy, and D.A. Bender (Eds.). 1999. 33rd International Particleboard/Composite Materials Symposium Proceedings, Washington State University, Pullman, WA. 209 p.
- Rammer, D.R., D.A. Bender, and D.G. Pollock. 1998. Withdrawal and lateral strength of threaded nails. Proc. 5th World Conf. on Timber Engr., Vol. 2, pp.238-245. Montreux, Switzerland, August 17-20.
- Tucker, B., D.A. Bender, and D.G. Pollock. 1998. Nondestructive evaluation of wood-plastic composites. Proc. 11th International Symposium on Nondestructive Testing of Wood, Madison, WI, September 9-11.
- Theilen*, R.D., D.A. Bender, S.G. Winistorfer and D.G. Pollock*. 1998. Lateral resistance of ring-shank nail connections using Southern pine lumber. Transactions of the ASAE 41(2):465-472.
- Wolcott, M.P., D.A. Bender and R.J. Tichy (Eds.). 1998. 32nd International Particleboard/Composite Materials Symposium Proceedings, Washington State University, Pullman, WA. 201 p.
- Bender, D.A., J.L. Tucker* and D.E. Bray. 1997. Angled-beam ultrasonic evaluation of particleboard. Proceedings of Workshop on Nondestructive Testing of Panel Products, pp.61-67, Llandudno, UK, October 11, 1997.
- Bethi*, R., D.A. Bender, K. McDonald and D.E. Bray. 1997. An ultrasonic technique for predicting tensile strength of Southern Pine lumber. Transactions of the ASAE 40(4):1153-1580.
- Dickens*, J.R., D.E. Bray and D.A. Bender. 1997. Beam profiles in wood from critically refracted longitudinal wave probes. Materials Evaluation 55(6):721-725.
- Skulteti*, M.J., D.A. Bender, S.G. Winistorfer and D.G. Pollock*. 1997. Withdrawal strength of ring-shank nails embedded in Southern Pine lumber. Transactions of the ASAE 40(2):451-456.
- Dickens*, J.R., D.A. Bender and D.E. Bray. 1996. A critical-angle ultrasonic technique for the inspection of wood parallel-to-grain. Wood and Fiber Science 28(3):380-388.
- Pollock, D.G., D.A. Bender and L.A. Soltis. 1996. Fasteners as damage indicators in timber structures. Proceedings of International Wood Engineering Conference '96, Volume 4, pp.38-45. New Orleans, LA, October 28-31.
- Pollock, D.G., D.A. Bender and K.G. Gebremedhin. 1996. Designing for chord forces in post-frame roof diaphragms. Frame Building News 8(5):40-44.
- Skulteti, M.J., D.A. Bender, S.G. Winistorfer and D.G. Pollock. 1996. Withdrawal resistance of ring-shank nails embedded in Southern pine lumber. Frame Building News 8(4):38-43.
- Theilen, R.D., D.A. Bender, D.G. Pollock and S.G. Winistorfer. 1996. Lateral performance of ring-shank nails in Southern Pine lumber. Frame Building News 9(1):62-71.

- Wills*, B.L., S.G. Winistorfer, D.A. Bender and D.G. Pollock*. 1996. Threaded nail fasteners - research and standardization needs. *Transactions of the ASAE* 39(2):661-668.
- Skaggs*, T.D. and D.A. Bender. 1995. Shear deflection of composite wood beams. *Wood and Fiber Science* 27(3):327-338.
- Suddarth, S.K. and D.A. Bender. 1995. Statistical fundamentals in wood engineering. *Wood Design Focus - A Journal of Contemporary Wood Engineering* 6(1):3-12.
- Taylor*, S.E., M.H. Triche, D.A. Bender, and F.E. Woeste. 1995. Monte-Carlo simulation methods for engineered wood systems. *Forest Products Journal* 45(7/9):43-50.
- Bender, D.A. (Ed.). 1993. *Wood Products for Engineered Structures: Issues Affecting Growth and Acceptance of Engineered Wood Products*. Proc. 47329, Forest Products Society, Madison, WI. 220 p.
- Bender, D.A., F.E. Woeste and R.L. Sutton. 1993. Structural loads and deflection criteria. In: *Post-Frame Building Design*. (Eds.) J.N. Walker and F.E. Woeste. ASAE Monograph No. 11, American Society of Agricultural Engineers, St. Joseph, MI, pp. 9-22.
- Skaggs*, T.D., F.E. Woeste and D.A. Bender. 1993. A simple analysis procedure for calculating post forces. *Applied Engineering in Agriculture* 9(2):253-259.
- Woeste, F.E., D.A. Bender and C.E. Siegel. 1993. Design considerations. In: *Post-Frame Building Design*. (Eds.) J.N. Walker and F.E. Woeste. ASAE Monograph No. 11, American Society of Agricultural Engineers, St. Joseph, MI, pp. 23-33.
- Hernandez*, R., D.A. Bender, B.A. Richburg* and K.S. Kline*. 1992. Probabilistic modeling of glued-laminated timber beams. *Wood and Fiber Science* 24(3):294-306.
- Richburg*, B.A. and D.A. Bender. 1992. Localized tensile strength and modulus of elasticity of E-rated laminating grades of lumber. *Wood and Fiber Science* 24(2):225-232.
- Taylor*, S.E., D.A. Bender, D.E. Kline* and K.S. Kline. 1992. Comparison of approaches for modeling effect of length on lumber tensile strength. *Forest Products Journal* 42(2):23-30.
- Winandy, J.E. and D.A. Bender. 1992. Treat wood right! *Frame Building News* 4(4):8-11.
- Woeste, F.E., D.A. Bender and C.E. Siegel. 1992. Post-frame building design considerations. *Wood Design Focus* 3(1):10-14.
- Zhao, W., F.E. Woeste and D.A. Bender. 1992. Effect of span-length on the reliability of truss bottom chords. *Transactions of the ASAE* 35(1):303-310.
- Bender, D.A. 1991. Rigid roof design for post-frame buildings. *Frame Building Professional* 3(6):4-11,30-33.
- Bender, D.A., T.D. Skaggs* and F.E. Woeste. 1991. Rigid roof design for post-frame buildings. *Applied Engineering in Agriculture* 7(6):755-760.
- Han*, M.B., D.A. Bender and S.E. Taylor*. 1991. Computer generation of highly skewed correlated random variables. *Transactions of the ASAE* 34(5):2279-2281.
- Taylor*, S.E. and D.A. Bender. 1991. Stochastic model of localized tensile strength and modulus of elasticity in lumber. *Wood and Fiber Science* 23(4):501-519.
- Bender, D.A., S.E. Taylor*, A.G. Burk* and J.A. Hooper*. 1990. Predicting localized MOE and tensile strength in solid and end-jointed laminating lumber using longitudinal stress waves. *Forest Products Journal* 40(3):45-47.
- Kline*, D.E. and D.A. Bender. 1990. Maximum likelihood estimation for shifted Weibull and Lognormal distributions. *Transactions of the ASAE* 33(1):330-335.
- Burk*, A.G. and D.A. Bender. 1989. Simulating finger joint performance based on localized constituent lumber properties. *Forest Products Journal* 39(3):45-50.

- Taylor*, S.E. and D.A. Bender. 1989. A method for simulating multiple correlated lumber properties. *Forest Products Journal* 39(7/8):71-74.
- Bender, D.A., S.E. Taylor* and J.W. Swinnea*. 1988. Load rate adjustment for tensile proof testing of southern pine 2 by 10's. *Forest Products Journal* 38(6):26-30.
- Taylor*, S.E. and D.A. Bender. 1988. Simulating correlated lumber properties using a modified multivariate normal approach. *Transactions of the ASAE* 31(1):182-186.
- Schaffer, E.L., C.M. Marx, D.A. Bender, and F.E. Woeste. 1986. Validation and fire endurance of glued-laminated beams. USDA Forest Service Research Paper FPL 467, U.S. Forest Products Laboratory, Madison, WI. 16 p.
- Bender, D.A., F.E. Woeste, E.L. Schaffer, and C.M. Marx. 1985. Reliability formulation for strength and fire endurance of glued-laminated beams. USDA Forest Service Research Paper FPL 460, U.S. Forest Products Laboratory, Madison, WI. 43 p.

EDITORIAL AND TECHNICAL REVIEW ACTIVITIES:

- Editorial Board, *Wood Design Focus – A Journal of Contemporary Wood Engineering*, Forest Products Society, Chair, 2000-2002, Member 2002-present.
- Editorial Board, *Sensing and Imaging: an International Journal*, 2006-present
- Editorial Board, *International Journal of Subsurface Sensors and Applications*, 1998-2006
- Associate Editor, Structures and Environ. Division, Amer. Society of Agric. Engrs., 1990-2001.
- Editorial Board, *Frame Building News*, National Frame Builders Association, 1991-2001.
- Contributing Editor, *Wood Design Focus*, Volume 16, Number 3, 2006.
- Contributing Editor, *Wood Design Focus*, Volume 3, Number 1, 1992.
- Review Panel member for USDA NRI and NSF SBIR Competitive Grant Programs
- Reviewer for the following technical journals: *ASCE Journal of Structural Engineering*, *Forest Products Journal*, *Wood and Fiber Science*, *Transactions of the ASAE*, *Applied Engineering in Agriculture*

SELECTED PROFESSIONAL SERVICE ACTIVITIES:

American Society of Civil Engineers

- Structural Engineering Institute, 2000-present
- Committee on Wood Building Design, 2000-present
- Committee on Wood Research, 2000-present
- Task Group on Wood Engineering Education, 1990-91

American Forest & Paper Association/ American Wood Council

- Wood Design Standards Committee, 2004-present

American Lumber Standard Committee, Consumer Representative, 1995-present

American Society for Testing and Materials

- Task Group on Glulam Timber Modeling, Chair, 1988-90
- Task Group on Statistical Modeling, Chair, 1988-89
- Wood Construction Technical Committee, 1988-present

American Institute of Timber Construction

- Technical Review Board, 1992-96
- Technical Advisory Committee, 1987-present
- Research Overview Committee, Chair, 1989-94

American Society of Agricultural Engineers

- Structures & Environment Division, Vice-Chair, 1997-98; Chair, 1998-99

Structures Committee, 1985-present; Sec., 1989-90; Vice-Chair, 1990-91; Chair, 1991-92
Wood Construction and Engineering Committee, 1990-present
Technical Paper Awards, 1993-99; Chair, 1998-99

National Frame Builders Association

Frame Building News Editorial Board, 1990-2001
Education and Research Committee, 1991-2001

Forest Products Society

International Nominating Committee, 2004, 2001
Conference Chair, Wood Products for Engineered Structures, Las Vegas, NV, 1992.
Trustee, Mid-South Section FPRS, 1991-1997

Society of Wood Science and Technology

Board of Directors, 2005-2007
George Marra Award Committee, Vice-Chair, 2001; Chair, 2002

World Conference on Timber Engineering, Portland, Oregon, 2006. Served as Technical Secretariat.