

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

Professor, Department of Civil and Environmental Engineering
Director, Composite Materials & Engineering Center
Washington State University
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TECHNICAL INTERESTS:

Engineering analysis and design of timber structures; deck safety; laboratory testing and analysis of engineered wood components, composite materials, connections and assemblies; post-frame construction; nondestructive evaluation of wood materials; wood durability; building envelopes.

EXPERIENCE:

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

Director (5/09-present), Composite Materials & Engineering Center, Washington State University, Pullman, WA.

Director (5/97-4/09), Wood Materials & Engineering Laboratory, Washington State University, Pullman, WA.

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. Purdue University, 1984

M.S. Virginia Tech University, 1980

B.S. Virginia Tech University, 1979

PROFESSIONAL LICENSE:

Registered Professional Engineer: Texas #60964

PROFESSIONAL MEMBERSHIPS:

American Society of Civil Engineers (ASCE)

American Society Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

American Society for Testing and Materials (ASTM)

Forest Products Society (FPS)

Society of Wood Science and Technology (SWST)

National Institute of Building Sciences (NIBS)

HONORS AND AWARDS:

Six national-level journal article awards from SWST, FPS and ASABE

Two national-level awards from the post-frame building industry

Weyerhaeuser Distinguished Professor of Civil Engineering, WSU, 1997-present

Leon Luck Faculty Award. Department of Civil & Environmental Engineering, WSU, 2007

Outstanding Teaching Faculty Award. College of Engineering and Architecture, WSU, 2002

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

Environmental Design of Structures

Materials & Design of Structures

Graduate Courses

Advanced Timber Engineering

Probability and Statistical Models in Engineering

Graduate Seminar

Short Courses to Practicing Design Professionals

Structural Design with Wood

Deck Safety and Design

Post-Frame Building Design

Structural Wood Products and Wood Preservation

PATENT AND INVENTION DISCLOSURE

Bender, D.A. and B.J. Tucker. 2000. Continuous ultrasonic scanner for extruded wood-plastic composites. Invention disclosure, WSU Office of Intellectual Property Administration.

Bender, D.A. and J.M. Sample. 1999. Laminated ball bat. United States Patent No. 6,007,440.

SELECTED PUBLICATIONS

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

Lyman, G.H. and D.A. Bender. 2013. Wind load determination for residential decks. Wood Design Focus – A Journal of Contemporary Wood Engineering 23(2):3-8.

Lyman, G.H., D.A. Bender and J.D. Dolan. 2013. Seismic load determination for residential decks. Wood Design Focus – A Journal of Contemporary Wood Engineering 23(2):9-14.

Parsons, B.J., D.A. Bender, J.D. Dolan and F.E. Woeste. 2013. Deck and porch lateral loading by occupants. Wood Design Focus – A Journal of Contemporary Wood Engineering 23(2):15-20.

Parsons, B.J., D.A. Bender, J.D. Dolan, R.J. Tichy and F.E. Woeste. 2013. Lateral load path and capacity of exterior decks. Wood Design Focus – A Journal of Contemporary Wood Engineering 23(2):21-30.

Parsons, B.J., D.A. Bender, J.D. Dolan and F.E. Woeste. 2013. Deck and porch floor lateral loading by occupants. ASCE Practice Periodical on Structural Design and Construction (accepted).

Parsons, B.J., Bender, D.A., Dolan, J.D., Tichy, R.J., and Woeste, F.E. 2013. Lateral load path and capacity of exterior decks. ASCE Practice Periodical on Structural Design and

- Construction (accepted).
- Bender, D.A. and D.P. Mill*. 2012. Simplified lateral design of post-frame buildings. *Frame Building News* 24(5):32-37.
- Bender, D.A. and F.E. Woeste. 2012. Effect of variability on lumber design values. *Frame Building News* 24(4):34-39.
- Woeste, F.E. and D.A. Bender. 2012. Wood truss bracing rules updated – Part 1. *Structural Engineer magazine* (February):32-33.
- Woeste, F.E. and D.A. Bender. 2012. Wood truss bracing rules updated – Part 2. *Structural Engineer magazine* (April):44-45.
- Bender, D.A. and F.E. Woeste. 2011. Creep deflection in design of metal plate connected wood trusses. *ASCE Practice Periodical on Structural Design and Construction* 16(1):10-14.
- Bender, D.A., F.E. Woeste and R.E. Kimble*. 2010. Method for increased buckling capacity of built-up beams and columns. *Frame Building News* 22(4):28-32.
- Bender, D.A. and F.E. Woeste. 2010. Multiple-bolt wood connection design topics. *Structure magazine* (August):24-26.
- Graham*, D.A., D.M. Carradine, D.A. Bender and J.D. Dolan. 2010. Performance of log shear walls subjected to monotonic and reverse-cyclic loading. *ASCE Journal of Structural Engineering* 136(1):37-45.
- Graham*, D.A., D.M. Carradine, D.A. Bender and J.D. Dolan. 2010. Monotonic and reverse-cyclic loading of lag screw connections for log shear wall construction. *ASCE Journal of Materials in Civil Engineering* 22(1):88-95.
- Kimble*, R.E. and D.A. Bender. 2010. Stability of built-up timber beams and columns – accounting for modulus of elasticity variability. *ASCE Practice Periodical on Structural Design and Construction* 15(4):272-277.
- Michaels, S.G., V. Yadama and D.A. Bender. 2010. Effect of tie-layer on the bond strength between thermoplastic and borate treated wood-substrate. *Wood and Fiber Science* 42(4):419-428.
- Lee, H.H. and D.A. Bender. 2009. Far infrared emissivity of wood material – comparing the three heat transfer modes of wood box and aluminum box. *Journal of Korean Wood Science and Technology (Mokchae Konghak)* 37(5):440-450.
- Ross, L.A., D.A. Bender and D.M. Carradine. 2009. Performance of post-frame shear walls with a wood-plastic composite skirtboard subjected to monotonic racking loads. *Transactions of the ASABE* 52(2):583-589.
- Ross, L.A., D.A. Bender and D.M. Carradine. 2009. Strength and stiffness of post-frame shear walls with wood plastic composite skirtboards. *Frame Building News* 21(5):28-33.
- Schildmeyer, A.J., M.P. Wolcott and D.A. Bender. 2009. Investigation of the temperature-dependent mechanical behavior of a polypropylene-pine composite. *ASCE Journal of Materials in Civil Engineering* 21(9):460-466.
- Woeste, F.E. and D.A. Bender. 2009. Design responsibilities for metal-plate-connected wood truss building construction. *Structure magazine* (August):24-26.
- 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, *ASCE Journal of Architectural Engineering – Section on Housing and Residential Building Construction*, 2013-present.
- Editorial Board, *Sensing and Imaging: an International Journal*, 2006-2012.
- 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*, Vol. 16, No. 3, 2006; and Vol. 3, No. 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*, *ASCE Journal of Materials in Civil Engineering*, *ASCE Journal of Performance of Constructed Facilities*, *Journal of Civil Engineering and Management*, *Forest Products Journal*, *Wood and Fiber Science*, *Wood Science and Technology*, *Holzforschung*, *Transactions of the ASABE*, *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 Wood Council

- Wood Design Standards Committee, 2004-present.
- ANSI/AWC NDS National Design Specification for Wood Construction
- ANSI/AWC Special Design Provisions for Wind and Seismic
- ANSI/AWC Wood Frame Construction Manual

American Lumber Standard Committee, Consumer Representative appointed by the U.S. Secretary of Commerce, 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, 1987-1997
Research Overview Committee, Chair, 1989-94

American Society of Agricultural & Biological 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

Conference Co-Chair, 63rd International Convention, Boise, ID, 2009
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

Truss Plate Institute

Project Committee to update *ANSI/TPI 1 National Design Standard for Metal Plate Connected Wood Truss Construction*, voting member 2010-present
ANSI/TPI 3 Project Committee to develop a standard for bracing metal plate connected wood trusses, voting member 2009-present

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

International Conference on Stability and Ductility of Structures. Vilnius, Lithuania, 2009.
Scientific Committee member