March 2005

Bruce W. Main, PE, CSP

PROFESSIONAL EXPERIENCE

DESIGN SAFETY ENGINEERING, INC. Ann Arbor, Michigan
President (1995 to present) www.designsafe.com

Engaged in mechanical and safety engineering project consultations and execution. Overseeing operations, financing, marketing and management of engineering consulting and risk assessment software business. Technical areas of specialization include:

- Mechanical Design
- Machine Guarding
- Product Fire Analyses and Reconstruction
- Risk Assessments of Products and Processes
- Safety Through Design
- Accident Reconstruction
- Product Safety Evaluations

MILLER ENGINEERING, INC. Ann Arbor, Michigan
Senior Mechanical Engineer (1988 - 1995)

Performed mechanical and safety engineering analyses and investigations of consumer and industrial products. Conducted and published original research. Provided expert witness testimony in above specialty areas.

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION McLean, Virginia
Analyst, Military Operations Analysis Division (1987 - 1988)

Activities included technical studies, systems analyses, mechanical design, and program management assistance for US Army materiel acquisition programs.

THE CHARLES STARK DRAPER LABORATORY Cambridge, Massachusetts
Associate Engineer (1984 - 1986)

Product design and testing on military and commercial projects.

EDUCATION

Massachusetts Institute of Technology, B.S. Mechanical Engineering (1987) Cambridge, Massachusetts
University of Michigan, M.S. Mechanical Engineering (1991) Ann Arbor, Michigan
University of Michigan, M.B.A (1997) Ann Arbor, Michigan

PROFESSIONAL REGISTRATION AND CERTIFICATION

Professional Engineer (Michigan License #40570, Illinois License #062-056508)
Certification in Product Safety Management (C.P.S.M. #0462) (1994 - 1999)
Certified Safety Professional (#15650)

PROFESSIONAL AFFILIATIONS

American Society of Mechanical Engineers (ASME) National Fire Protection Association (NFPA)
American Society of Safety Engineers (ASSE)

ANSI B11 Machine Tool Industry - Primary representative to the Accredited Standards Committee for ASSE
ANSI B11 TR3 Risk Assessment and Risk Reduction for Machine Tools – Committee member
ANSI/RIA R15.06 Safety requirements for Industrial Robots - Committee member
Institute for Safety Through Design, (National Safety Council) - Member of Advisory Committee (1995-2005)
ANSI/PMMI B155.1 Packaging Machinery Safety Requirements – Committee member
ISO TC199 (Machinery) / Working Group 5 (Risk Assessment) - Technical Expert

PRIMARY PUBLICATIONS

Books/Chapters

Main, B.W., (2004). "Risk Assessment: Basics and Benchmarks" design safety engineering, inc., Ann Arbor, MI.

Main, B.W., Cloutier, D.R., Manuele, F.A., Bloswick, D.S. (2003) "Risk Assessment for Maintenance Work," design safety engineering, inc., Ann Arbor, MI.

Main, B.W. (1999). " What Do Engineers Really Know and Do About Safety?" Chapter 5 in "Safety Through Design", Institute for Safety Through Design, NSC Press.

Main, B.W. (1999). "Applying Safety By Design For Product Liability Prevention" Chapter 12 in "Safety Through Design", Institute for Safety Through Design, NSC Press.

Risk Assessment / Safety Through Design

Main, B.W., (2005), Real World Risk Assessment Applications: Situations and Solutions, American Society of Safety Engineers Using Risk Principles Symposium, San Diego, CA, March.

Main, B.W., (2004), Risk Assessment: A Review of the Fundamental Principles, *Professional Safety*, December.

Main, B.W., Cloutier, D.R., (2003) Maintenance Risk Assessment, Current Trends, Impressions and Practices, American Society of Safety Engineers Annual Professional Development Conference, Denver, CO.

Manuele, FA. and Main, B.W, (2002), On Acceptable Risk, *Occupational Hazards*, January

Main, B.W., (2002), Design Reviews: Checkpoints for Design, *Professional Safety*, January.

Main, B.W., (2001), Risk Assessment: Why & What You Need to Know, American Society of Safety Engineers 40th Annual Professional Development Conference, Anaheim, CA.

Main, B.W., (2000), "Risk Assessment Benchmarks 2000: Getting Started, Making Progress", design safety engineering, inc. Ann Arbor, MI.

Main, B.W., (2000), "Industry Advances in Hazard Analysis and Risk Assessment," National Manufacturing Week, Chicago, IL.

Main, B.W., McMurphy, K.J., (1999), "Hazard Analysis and Risk Assessment in Manufacturing Processes," National Manufacturing Week, Chicago, IL.

Main, B.W., McMurphy, K.J., (1999), "Safety Through Design: the state of the art in safety processes," SAE 1999-01-0421, Society of Automotive Engineers Conference, Detroit, MI.

Main, B.W., McMurphy, K.J., (1998), "Safer By Design: reducing hazards through better designs" *Professional Safety*, Vol. 43, No.2, February.

Christensen, W. and Main, B.W., (1996), "Compendium of the 1996 Integrating Safety Through Design Symposium," 17-19 September 1996, National Safety Council.

Main, B.W., (1996). "Safer By Design," *Machine Design*, Vol. 28, No. 17, 26 September 1996.

Main, B.W., (1995). "An Ergonomic Approach to Chair Arm Strength Test Development: Evaluating A New Product Design Using Collateral Standards," Thirteenth International System Safety Conference, San Jose, California, July.

Main, B.W. and Frantz, J.P. (1994). "What the Safety Community Should Know About How Design Engineers Address Safety." *Professional Safety*, Vol. 39, No. 2, February.

Main, B.W., Ward, A.C., (1992) "What Do Engineers Really Know and Do About Safety?, Implications for Education, Training, and Practice," *Mechanical Engineering*, Vol. 114, No. 8, August.

Main, B.W., (1991) "What Do Engineers Really Know and Do About Safety? A Survey of the Mechanical Engineering Design Community," University of Michigan, MSE Thesis, December.

Accident Reconstruction

Main, B.W. (1996, 1997, 1998), Accident Reconstruction Sessions, Review Committee, Society of Automotive Engineers.

Main, B.W., Knopf, E., (1995) "A New Application of Camera Reverse Projection in Reconstructing Old Accidents," SAE Technical Paper Series #950357, SAE Conference, Detroit, MI.

PRIMARY PUBLICATIONS (continued)

Fire Science

Main, B.W., Rhoades, T.P. and Frantz, J.P; (1994) "Are Current Product Labeling Systems Effective?," *NFPA Journal*, January/February, p 71-6.

Main, B.W., Frantz, J.P., and Rhoades, T.P. (1993). "Do Consumers Understand the Difference Between 'Flammable' and 'Combustible'?" *Ergonomics in Design,* July, pp. 14-18.

Warning Effectiveness

Frantz, JP., Rhoades, T.P., and Main, B.W, (1994). "The Ability of Three Lay Groups to Judge Product Warning Effectiveness." Proceedings of the American Bar Association National Institute on Product Warnings, Instructions and User Information, January, pp. 1-16.

Frantz, J.P., Miller, J.M., and Main, B.W. (1993). "The Ability of Two Lay Groups to Judge Product Warning Effectiveness." Annual Proceedings of the Human Factors and Ergonomics Society, Santa Monica, CA.

Other

Ross, K, and Main, B.W., (2001). Risk Assessment and Product Liability, For The Defense, April.

Main, B.W., Lynch, M. "Establishing the State of the Art: tools to use in product liability litigation", National Law Journal, September 1997.

Main, B.W., Grieser, B., (1995). "On Water Tests of Seat Occupant Loads in Residential Boats," Test report submitted to ABYC, 9 June.

Main, B.W., (1995) "Towards Reconstruction Minimum Speeds in Recreational Boating Accidents," SAE Technical Paper Series #950732, SAE Conference, Detroit, MI.

Miller, J.M., Main, B.W., Iqball, C.S., Grieser, B.C. (1994). "Occupant Protection in Recreational Boating", Final Report to U.S. Coast Guard, September.

Main, B.W., Frantz, J.P, and Rhoades, T.P. (1993). "How Human Factors Engineering Improves Safety," Reduces Liability, Leaders Product Liability Law and Strategy, October.

Main, B.W., Ward, A.C., (1992). "A Potential Framework for CAD/CAE/CIM Decisions," ASME CIE Conference, San Francisco, CA, September.

Morsch, B.A., Main, B.W., (1988). "Evaluation, Analysis, and Documentation Support for the 10 KW Signature Suppressed Lightweight Electric Energy Plant (SLEEP)", US Army BRDEC, Ft. Belvoir, VA, Contract Number DAAK70-84-D-0053, February.

PRESENTER/ GUEST LECTURER/INSTRUCTOR

American Society of Mechanical Engineers
American Society of Safety Engineers
Association of Equipment Manufacturers
Association of Home Appliance Manufacturers
Central Michigan University, Mount Pleasant, MI
Defense Research Institute
Institute for Safety Through Design
National Safety Council
Packaging Machinery Manufacturers Institute
Precision Metalforming Association
Robotic Industries Association
University of Michigan, Ann Arbor, MI
Vanderbilt University, Nashville, TN