

George B. Page
Page Engineering, Inc.
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Professional Interests

- Physical job exposure assessment
- Strength assessment and prediction
- Job and process design
- Safety and health risk assessment
- Accident/incident reconstruction
- Management of process improvement
- Management of occupational risk
- Industrial ergonomics
- Work measurement
- Occupational biomechanics
- Human factors engineering
- Safety engineering
- Occupational epidemiology
- Industrial engineering

Education Attained

- Ph.D. Candidate Industrial and Operations Engineering (Ergonomics Option), University of Michigan. Topic of dissertation: *“Functional grip strength: conceptual and empirical models of biomechanical, perceptual, and tribological factors.”* 1994.
- M.S.E. Industrial and Operations Engineering (Ergonomics Option), University of Michigan, December 1985.
- B.S.E. Industrial and Operations Engineering, University of Michigan, August 1984.

Standards Committee Memberships

- Member (from 2019 to present) of ISO-TC108-SC4, Human Exposure to Mechanical Vibration and Shock
- Member (from 1990 through 1997) of the ANSI-Accredited Z-365 Standards Committee on the Control of Cumulative Trauma Disorders. Alternate Member through 1998.

Professional Societies and Memberships

- Human Factors & Ergonomics Society
- International Society for Occupational Ergonomics and Safety
- Institute of Industrial & Systems Engineering
- International Society of Biomechanics
- American Industrial Hygiene Association
- American College of Occupational and Environmental Medicine

Professional Certification and Service

- Certificant #609, Board of Certification in Professional Ergonomics, since 1994
- disAbility Connections, Inc., Center for Independent Living -- Board of Directors, member, since September 2008, Board Chairman 2011-2012, 2016-2017.
- disAbility Connections, Inc., Foundation – Board of Directors, member, since September 2010, Board Chairman 2014-2017.
- Jackson College Foundation – Board of Directors, member, since July 2018.
- Judge at 2020 and 2021 Annual General Donald R. Keith Memorial Conference, USMA, Department of the Army, Department of Systems Engineering, West Point, NY.
- Member of Rotary International
- Member of International Advisory Committee for 21st Annual International Society for Occupational Ergonomics and Safety Conference
- Recipient of John Deere Foundation “Engineering Scholarship”

Professional Experience

Business Owner/Manager

March 1994 to present

- Owner and manager of Page Engineering, Inc., an ergonomics and industrial engineering services business that primarily serves the railroad industry along with other industrial clients.

Ergonomics Consulting

August 1991 to present

- Manager – Ergonomics and Occupational Biomechanics, Union Pacific Railroad Company (since January 2005).
- Assisting railroads in applying ergonomics to workplace processes, tools, and equipment.
- Assisting industrial clients in applying ergonomics to workplace processes, tools, and equipment, including BTE, FEDEX, Fiat Chrysler Automobiles, Ford Motor Company, Lear Seating, USPS, and the Blue Water Bridge Authority.
- Assisting business and industrial clients with regulatory matters regarding ergonomics, including the Food Distributors International, the American Petroleum Institute, the Food Marketing Institute, and the Association of Washington Businesses.

Faculty Member for Conference on Function-Based Medicine

University of Florida and AADEP, Pittsburgh, PA

April 7th-9th, 2006

Hospital General De Mexico, Mexico City

March 19th-23rd, 2007

Graduate Teaching Assistant for “Occupational Biomechanics”

The University of Michigan, Ann Arbor, Michigan

January 1993 through April 1993.

Senior Research Engineer

Association of American Railroads

June 1986 to August 1991

- Designed, managed, and conducted safety research projects to improve employee performance, safety, and health in the railroad industry for the Safety Research Division of the Research and Test Department. Projects included:
 - ergonomic analyses of switch stand operation, maintenance, and design;
 - biomechanical and functional strength analysis of hand brake operation.
- Worked with railroad personnel and equipment suppliers across the industry to assist in improving equipment, tool, and job design.
- Partook in the management and development of a compendium of ergonomics reference and training materials.

Graduate Research Assistant

University of Michigan, Center for Ergonomics
May 1984 to June 1986

- Wrote, assembled and co-edited training materials on behalf of Ford Motor Company covering the ergonomics topic areas addressed by the Center for Ergonomics faculty.
- Performed laboratory research developing models of the low-back and validating their accuracy for applied use.
- Analyzed the ergonomic issues of current mailbag designs and recommended design improvements.

Research Publications (conference proceedings, journals, book chapters)

Weames, G., Fleming, S. and Page, G. (2021). *Whole-body vibration exposure assessment – a demonstration for the need of a “gold standard.”* Proceedings of the 8th American Conference on Human Vibration, Virtual Conference.

Fleming, S., Weames, G. and Page, G. (2020). *Whole-body vibration exposure: A demonstration of the importance of artifact removal.* Proceedings of the 9th Annual World Conference of the Society of Industrial and Systems Engineering, Virtual Conference.

Page, G., Fleming, S. and Weames, G. (2020). *Ergonomics evaluation of a rail car riding platform.* The 32nd annual International Occupational Ergonomics and Safety Conference, Virtual Conference.

Weames, G., Fleming, S. and Page, G. (2020). *Head and low-back human activity peak acceleration analysis considerations.* The 32nd annual International Occupational Ergonomics and Safety Conference, Virtual Conference.

Fleming, S., Page, G., Burns, D., Grogan, J. and Weames, G. (2019). *Quantifying the magnitude and direction of freight car accelerations during slack action events.* Proceedings of the 31st Annual International Occupational Ergonomics and Safety Conference, New Orleans, LA.

Page, G., Fleming, S., Burns D., Grogan, J., Weames, G. (2019). *Quantifying grip strength requirements while riding freight cars during slack action events—A preliminary investigation.* Proceedings of the 31st Annual International Occupational Ergonomics and Safety Conference, New Orleans, LA.

Page, G., Fleming, S., Weames, G., and Vanderpool, J. (2018). *Railroad hand switch stand operation—An update.* Proceedings of the 30th Annual Occupational Ergonomics and Safety Conference, Pittsburgh, PA.

Fleming, S, Page, G., Weames, G. and Vanderpool, J. (2018). *Quantifying grip strength requirements while riding freight cars during slack action events.* Proceedings of the 30th Annual Occupational Ergonomics and Safety Conference, Pittsburgh, PA.

- Page, G., Weames, G., and Fleming, S. (2017). *Getting a handle on grip strength*. Proceedings of the 29th Annual Occupational Ergonomics and Safety Conference, Seattle, WA.
- Fleming, S., Page, G., and Weames, G. (2017). *A human factors approach to evaluating led light fixtures for use in railroad locomotive headlight applications*. Association of Canadian Ergonomists (ACE), Proceedings of the 48th Annual Conference, Banff, Alberta.
- Page, G., Fleming, S., and Weames, G. (2017). *Sensitivity analysis of braking decelerations across different speeds and braking strategies*. Association of Canadian Ergonomists (ACE), Proceedings of the 48th Annual Conference, Banff, Alberta.
- Weames, G., Page, G., Vanderpool, J., Fleming S. (2017). *Analysis of the exposure to occupational physical factors for the railroad track welder in maintenance-of-way*. Proceedings of the 6th Annual World Conference of the Society for Industrial and Systems Engineering. Washington, DC.
- Weames, G., Page, G., Vanderpool, J., Fleming S. (2017). *Analysis of the exposure to occupational physical factors for the railroad track section maintainer in maintenance-of-way*. Proceedings of the 6th Annual World Conference of the Society for Industrial and Systems Engineering. Washington, DC.
- Page, G., Weames, G., and Fleming, S. (2016). *Grip force needs when riding railroad freight cars while stopping*. Proceedings of the 5th Annual World Conference of the Society for Industrial and Systems Engineering. San Francisco, CA.
- Weames, G., Fleming, S. and Page, G. (2016). *Data collection and analysis affects to the results of whole-body vibration exposure for machine operators*. Association of Canadian Ergonomists (ACE), Proceedings of the 47th Annual Conference, Niagara Falls, Ontario.
- Page, G., Fleming, S., Weames, G. (2016). *Sensitivity analysis of artifact removal and sampling period strategies upon whole-body vibration measurement*. Proceedings of the 28th Annual Occupational Ergonomics and Safety Conference, Chicago, IL.
- Page, G., Weames, G., and Fleming, S. (2015). *Effect of Track Classification on Whole-Body Vibration at the Locomotive Cab Seat*. Proceedings of the 4th Annual World Conference of the Society for Industrial and Systems Engineering. Ft. Lauderdale, FL.
- Fleming, S, Page, G, and Weames, G. (2015). *Whole-body vibration exposure: an investigation of driving method effect during railroad freight car inspection*. Association of Canadian Ergonomists (ACE), Proceedings of the 46th Annual Conference: Waterloo, Ontario.
- Page, G. Weames, G, Fleming, S. and Vanderpool, J. (2015). *Slow and Steady: Safe Lifting at the Ready*. The 27th Annual Occupational Ergonomics and Safety Conference. Nashville, TN.

- Weames, G., Fleming, S., and Page, G. (2014). *Locomotive Train Crew Whole-Body Vibration Exposure: An Investigation of Speed-Restriction Administrative Controls*. Proceedings of the 45th Annual Conference of the Association of Canadian Ergonomists. Montreal, Quebec.
- Weames, G., Page, G., Vanderpool, J., Fleming, S., and Frohlich, J. (2013). *Frequency and duration of occupational physical factors for the job of the North American railroad carman in car repair service: in support of risk evaluation*. Proceedings of the 44th Annual Conference, Association of Canadian Ergonomists. Whistler, British Columbia.
- Weames, G., Page, G., Vanderpool, J., Frohlich, J., Fleming, S. (2013). *Modeling of occupational physical factors for the job of the North American railroad carman in car repair service: in support of risk evaluation*. Proceedings of the 44th Annual Conference, Association of Canadian Ergonomists. Whistler, British Columbia.
- Fleming, S., Page, G., Weames, G., Vanderpool, J., and J. Frohlich (2013). *Analysis of Whole-Body Vibration Exposures Associated with Commonly Used Land and Aquatic Vehicles*. Proceedings of the 25th Annual International Occupational Ergonomics and Safety Conference, Atlanta, GA.
- Weames, G., Brown, R., Page, G., Vanderpool, J., Fleming, S., Frohlich, J. (2012). *Analysis of exposure to upper and lower extremity occupational physical factors in North American Railroad Carmen-Inspectors*. Proceedings of the 24th Annual International Occupational Ergonomics and Safety Conference, Fort Lauderdale, FL.
- Weames, G., Brown, R., Page, G., Vanderpool, J., Fleming, S., Frohlich, J. (2012). *Analysis of exposure to cervical and lumbar spine occupational physical factors in North American Railroad Carmen-Inspectors*. Proceedings of the 24th Annual International Occupational Ergonomics and Safety Conference, Fort Lauderdale, FL.
- Weames, G., Brown, R., Frohlich, J. Page, G., Vanderpool, J., Fleming, S. (2011). *Analysis of exposure to lower extremity occupational physical factors in North American train crews: walking and ballasted surfaces*. Proceedings of the 23rd Annual International Occupational Ergonomics and Safety Conference, Baltimore, MD.
- Page, G., Fleming, S., Weames, G., Vanderpool, J., and Frohlich, J. (2010). *Data compilation and risk analysis for exposure to occupational physical factors for the North American railroad train crew: part II*. Proceedings of the 41st Annual Conference of the Association of Canadian Ergonomist, Kelona, British Columbia.
- Weames, G., Page, G., Vanderpool, J., Fleming, S., Frohlich, J. (2010). *Data compilation and risk analysis for exposure to occupational physical factors for the North American railroad train crew: part I*. Proceedings of the 41st Annual Conference of the Association of Canadian Ergonomist, Kelona, British Columbia.

- Page, G., Fleming, S., Weames, G., Vanderpool, J., and Frohlich, J. (2010). *Whole-body Vibration Exposure at the Seat Pan: an investigation of jointed rail upon the locomotive cab*. Proceedings of the 22nd Annual International Occupational Ergonomics and Safety Conference, Tempe, AZ.
- Page, G., Fleming, S., Weames, G., Vanderpool, J., and Frohlich, J. (2010). *Rock and Roll: Perception and reality of whole-body vibration exposure under different service conditions*. Proceedings of the 22nd Annual International Occupational Ergonomics and Safety Conference, Tempe, AZ.
- Page, G., Weames, G., Vanderpool, J., Fleming, S., Frohlich, J. (2010). *Whole-body Activity and Postural Fixity and Neutrality: A case study of North American railroad conductor/brakemen*. Proceedings of the 22nd Annual International Occupational Ergonomics and Safety Conference, Tempe, AZ.
- Page, G., Weames, G., Vanderpool, J., Fleming, S. Frohlich, J., and Hunt, W. (2009). *Postural Fixity and Neutrality: a case study of the modern North American locomotive cab environment*. Proceedings of the 21st International Society of Occupational Ergonomics and Safety (ISOES) Annual Conference, Dallas.
- Page, G., Weames, G., Vanderpool, J., and Fleming, S. (2009). *Whole-Body Postural Adaptation During Manual Materials Handling-Type Exertions: Implications for job task assessment*. Proceedings of the 21st International Society of Occupational Ergonomics and Safety (ISOES) Annual Conference, Dallas.
- Page, G., Vanderpool, J., Fleming, S., and Jones, T. (2008). *Whole-Body Postural Adaptation During Pull-Type Exertions: What is the Driving Force? What are the Practical Implications?* Proceedings of the 20th International Society of Occupational Ergonomics and Safety (ISOES) Annual Conference, Chicago.
- Page G., Holland, J., Jones, T., Hunt, W., Frohlich, J. (2008). *Ergonomics Risk Assessment—A tri-part approach*. Proceedings of the 20th International Society of Occupational Ergonomics and Safety (ISOES) Annual Conference, Chicago.
- Page, G.B., Chaffin, D.B. (1999). *Functional grip strength: a preliminary study on the comparative effects of fine and gross handle shape attributes (Finalist, Journal of Biomechanics Award)*. Proceedings of the 23rd Annual Meeting of the American Society of Biomechanics: Pittsburgh. pp. 292, 293.
- Nussbaum, M.A., Chaffin, D.B., Page, G.B. (1995). *A biomechanical investigation of the asymmetric multiplier in the revised NIOSH lifting equation*. Proceedings of the Annual Human Factors and Ergonomics Society Meeting.

- Kerk, C.J., Chaffin, D.B., Page, G.B., Hughes, R.E. (1994). *A comprehensive biomechanical model using strength, stability, and coefficient of friction constraints to predict hand force exertion capability during sagittally symmetric static exertions*. IIE Transactions, 26(3), 57-67.
- Chaffin, D.B., Page, G. (1994). *Postural effects on biomechanical and psychophysical weight lifting limits*. Ergonomics, 37(4), 663-676.
- Wiker, S.F., McMahan, P.B., Page, G.B. (1993). *Ergonomic Seating Design*. In D. Hansen (Ed.) The Work Environment Vol. III, Lewis Publishers: Chelsea, Michigan.
- Comai, W.J., Scott, R., Page, G. (1993). *Anticipated community needs for orthopedic subspecialties in the State of Michigan*, Michigan Association of Osteopathic Physicians and Surgeons 1993 Scientific Research Conference.
- Page, G.B., Brown, R.T., and McMahan, P.B. (1991). *Applying ergonomic criteria to railroad hand switch stand design*. In W. Karwowski and J.W. Yates (Eds.) Advances in Industrial Ergonomics and Safety III, Taylor and Francis: New York.
- Brown, R.T., Page, G.B., and McMahan, P.B. (1991). *A biomechanical evaluation of railroad car hand brake operating methods*. In W. Karwowski and J.W. Yates (Eds.) Advances in Industrial Ergonomics and Safety III, Taylor and Francis: New York.
- Page, G.B., McMahan, P.B., Brown, R.T., and Kerk, C.J. (1990). *The development of ergonomic guidelines for railroad hand switch operation*. Proceedings of the Annual Human Factors Society Conference.
- Nussbaum, M., Chaffin, D.B., Page, G.B. (1990). *A biomechanical analysis of switch stand operation using a two-dimensional dynamic model*. Proceedings of the Annual Meeting of the American Society of Biomechanics.
- Kerk, C.J., Chaffin, D.B., Page, G.B. (1990). *Preliminary evaluation of a comprehensive biomechanical model using strength, stability, and coefficient of friction constraints to predict hand force exertion capability during sagittally symmetric static exertions*. Proceedings of the Annual Meeting of the American Society of Biomechanics.
- Kerk, C.J., Chaffin, D.B., Page, G.B. (1990). *A comprehensive hand force prediction model*. Proceedings of the Annual American Industrial Hygiene Association Conference.
- Kuciemba, S.R., Page, G.B., Kerk, C.J., (1988). *An ergonomic investigation of railroad yard worker tasks*. Trends in Ergonomics/Human Factors V. North-Holland Publishers: Amsterdam.
- Chaffin, D.B., Bloswick, D., Page, G., (1986). *On the validity of worker low back strength prediction models*. Proceedings of the Annual American Industrial Hygiene Association Conference.

Chaffin, D.B., Andersson, G.B.J., Page, G., Bloswick, D.S. (1985). *Low-back muscle models—a sensitivity analysis*. Proceedings of the Annual Meeting of the American Society of Biomechanics.

Page, G. (1985). *A biomechanical analysis of current mailbag designs*. Trends in Ergonomic/Human Factors II, North-Holland Publishers: Amsterdam.

Technical Reports

McMahan, P.B., Page, G.B. (1993). *Manual hand switch operation*. Research and Test Department, Association of American Railroads. Washington.

Page, G.B., McMahan, P.B. (1990). *An ergonomic investigation of hand switch operation*. Research and Test Department, Association of American Railroads. Washington.

Page, G.B., Brown, R.T., McMahan, P.B. (1990). *An ergonomic evaluation of hand brake operating methods*. Research and Test Department, Association of American Railroads. Washington.

Farbry, J.E., Mavor, A.S., and Page, G.B. (1990). *Computerized forwarding system II: Prototype labeling case evaluation. (Technical Report)*. Prepared under contract by Essex Corporation of Alexandria Virginia for United States Postal Service, Merrifield, Virginia.

McMahan, P.B. and Page, G.B. (1986). *An evaluation of tool design and method of use of railroad tools on back stress and performance*. Research and Test Department, Association of American Railroads. Washington.

Page, G.B. (1985). *A comparison between the three-dimensional torso and the two dimensional sagittal plane models (Technical Report)*. Center for Ergonomics, University of Michigan: Ann Arbor.

Page, G.B. (1984). *A biomechanical comparison of current mailbag designs (Technical Report)*. Center for Ergonomics, University of Michigan: Ann Arbor.

Presentations (not including those associated with conference proceedings listed above)

Page, G., and Miller, C. (2010). *Ergonomics Process Development Using Post Offer of Employment Testing (POET)*. Applied Ergonomics Conference, March 23rd, San Antonio, TX.

Page, G. (2009). *North American Locomotive Cab Ergonomics—Posture and Seating*. Federal Railroad Administration (FRA), Railroad Safety Advisory Committee, April 16th. Washington.

- Page, G. (2002). *Ergonomics, workplace studies, and risk factors*. 2002 Upper Extremity Symptoms and the Workplace, American Society for Surgery of the Hand and American Association for Hand Surgery. Chicago, IL
- Page, G. (2002). *The need for regulations*. 2002 Upper Extremity Symptoms and the Workplace, American Society for Surgery of the Hand and American Association for Hand Surgery. Chicago, IL
- Page, G., Jones, T. (1997). *How to do a worksite evaluation*. American Society for Surgery of the Hand 52nd Annual Meeting. Denver, Colorado
- Page, G. (1997). *Risk communication considerations in ergonomics processes and policies*. Managing Ergonomics in the 1990's: A Discussion of the Science and Policy Issues. Cincinnati, Ohio. (Did not present due to travel difficulties).
- Ulin, S. and Page G.B. (1995). *Ergonomics (Status of the ANSI ASC Z-365 Control of Work-Related Cumulative Trauma Disorders Work Product)*, Annual Michigan Safety Conference, Lansing, Michigan
- Page, G.B. (1993). *Ergonomics in the Workplace*, 10th Annual Great Plains Safety and Health Conference and Products Show, Omaha, Nebraska
- Page, G.B. (1993). *Back pain, cumulative trauma disorders and ergonomics in the workplace*. Orthopedics Seminar Series, Bicounty Community Hospital, Warren, MI.
- Page, G.B. (1988). *Railroad Safety*. Human Factors Society, Potomac Chapter Annual Symposium.
- Page, G.B. (1987). *Ergonomic guidelines—tools for evaluation and control*. The National Safety Council Annual Congress.

Also numerous presentations regarding the safety research efforts of the Association of American Railroads.

Other

Eagle Scout, Troup 27, Toledo, Ohio, attained 1976