

**Richard W. Klopp, Ph.D., P.E.**  
**Senior Managing Engineer**

**Professional Profile**

Dr. Richard W. Klopp is a Senior Managing Engineer in Exponent's Mechanical Engineering and Materials/Metallurgy practice. Dr. Klopp specializes in mechanical engineering and the mechanics of materials. He has particular expertise in laboratory-based testing, mechanical design, failure analysis and prevention, and manufacturing. His mechanical engineering background includes extensive experience in machining; machinery; analysis of fasteners, gears, and bearings; power transmission; optical systems; metrology; and fluid handling components. His mechanics of materials background includes extensive experience in fracture mechanics, high strain rate deformation and failure, impact and shock wave loading, mechanical testing and optical measurement methods.

Dr. Klopp has applied his expertise to machine tools, industrial machinery, laser systems, automobiles, trucks, potable, fire protection, and wastewater system components, plumbing, computer equipment, electronic packaging, consumer products, medical equipment and medical devices, toys, recreational products, railroad tank cars, chemical storage tanks, underground tunnels, armor/anti-armor, and missile defense. Dr. Klopp has studied the mechanical behavior of metals, ceramics, rock, plastics, advanced composites, liquids, and wood.

Dr. Klopp has provided consulting services on matters of industrial problem solving, product recalls, product defect litigation, intellectual property disputes, national defense, and insurance issues.

Dr. Klopp is a skilled machinist qualified to set up and operate machine tools such as lathes, milling machines and other shop equipment. His personal machine shop is equipped with a computer numerical control (CNC) milling machine, manual milling machine, tool room lathe, grinders, and a wide variety of supporting tooling and equipment.

Prior to joining Exponent, Dr. Klopp was a Research Engineer at SRI International and worked as a Research Associate at Brown University.

**Academic Credentials and Professional Honors**

Ph.D., Engineering, Brown University, 1987  
Sc.M., Applied Mathematics, Brown University, 1986  
Sc.M., Engineering, Brown University, 1984  
B.S., Mechanical Engineering, Lehigh University, 1981

SRI International Postdoctoral Fellowship; University Fellowship, Brown University; Ingersoll Rand Award; Alfred Stenning Award

## Licenses and Certifications

Registered Professional Mechanical Engineer, California, #M31530

## Publications

Tokheim RE, Cooper T, Lew B, Klopp RW, Groethe MA, Peterson RR, Williamson D, Blanchard JP. Computational modeling of Z plasma-radiation-source debris. *J Radiat Eff Res Eng* 2004; 20(1).

Duffner DH, Klopp RW, Wagner-Jauregg A, Sire RA, Webster EM. Component damage from printed circuit board loading. Proceedings, IPC Printed Circuits Expo 2002, Long Beach, CA, IPC, pp. S12-4-1–S12-4-8, March 2002.

Kirkpatrick SW, Klopp RW. Hazard assessment for pressure tank cars involved in accidents. Proceedings, International Crashworthiness Conference (Icrash), London, UK, Chirwa EC and Otte D (eds), pp. 223–235, September 6–8, 2000.

Kobayashi T, Shockey DA, Schmidt CG, Klopp RW. Assessment of fatigue load spectrum from fracture surface topography. *Int J Fatigue* 1997; 19(1):S237–S244.

Klopp RW, Florence AL, Simons JW, Gran JK. Spherical Wave interaction with cylindrical holes in large limestone specimens. *J de Physique IV, Colloque C8, supplément au Journal de Physique III*, 1994; 4:735–740.

Klopp RW, Crocker JE. A dynamic fiber push-out test applied to metal-matrix composites. *J de Physique IV, Colloque C8, supplément au Journal de Physique III* 1994; 4:47–51.

Klopp RW, Crocker JE. Dynamic fracture behavior of SCS-6/Ti-15-3 metal-matrix composite. *Int J Fract* 1993; 61(R77–R83).

Klopp RW, Shockey DA. The strength behavior of granulated silicon carbide at high strain rates and confining pressure. *J Appl Phys* 1991; 70(12):7318–7326.

Giovanola JH, Klopp RW, Kirkpatrick, SW, McDonald WW. Dynamic fracture of welded joints. *J. de Physique, Colloque C3; 1991 1(suppl. III):565–572.*

Klopp RW, Shockey DA, Osher JE, Chau HH. Characteristics of hypervelocity impact debris clouds. *Int J Impact Eng* 1990; 10(1–4):323–335.

Klopp RW, Clifton RJ. Analysis of tilt in the high-strain-rate pressure-shear plate impact experiment. *J Appl Phys* 1990; 67(11):7171–7173.

Giovanola JH, Kobayashi T, Klopp RW, Gaines T, Arwood R. A note on dynamic displacement measurement using Hall Effect sensors. *J Test Eval* 1989; 17(3):196–200.

Klopp RW, Clifton RJ, Shawki T. Pressure-shear impact and the dynamic viscoplastic response of metals. *Mech Mater* 1985; 4(3&4):375–385.

## **Reports**

Klopp RW, Kirkpatrick SW, Shockey DA. Damage assessment of tank cars involved in accidents: Phase II—modeling and validation. Final Report DOT/FRA/ORD-02/04, Federal Railroad Administration, Office of Research and Development, 2002.

Klopp RW, Shockey DA, Curran DR, Cooper T. A granular flow model for developing smart armor ceramics. Final Report to Army Research Office on Contract DAAH04-94-K-0001, January 1998.

## **Book Chapters**

Kirkpatrick SW, Klopp RW. Risk assessment for damaged pressure tank cars. In: *Computer Technology and Applications, PVP-Vol. 458*. ASME, New York, NY, 2003.

Giovanola JH, Klopp RW, Crocker JE, Alexander DJ, Corwin WR, Nanstad RK. Using small cracked round bars to measure the fracture toughness of a pressure vessel steel weldment: A feasibility study. In: *Small Specimen Test Techniques, ASTM STP 1329*. Corwin WR, Rosinski ST, van Walle E (eds), ASTM, Philadelphia, PA, 1998.

Giovanola JH, Homma H, Lichtenberger M, Crocker JE, Klopp RW. Fracture toughness measurements using small cracked round bars. In: *Constraint Effects in Fracture: Theory and Applications, ASTM STP 1244*. Kirk M, Bakker A (eds), ASTM, Philadelphia, PA, 1994.

Klopp RW, Shockey DA, Seaman L, Curran DR, McGinn JT, de Resseguier T. A spherical cavity expansion experiment for characterizing penetration resistance of armor ceramics. In: *Mechanical Testing of Ceramics and Ceramic Composites, AMD-Vol. 197*. ASME, New York, NY, 1994.

Curran DR, Seaman L, Klopp RW, de Resseguier T, Kanazawa C. A granulated material model for quasibrittle solids. In: *Fracture and Damage in Quasibrittle Structures*. Bazant ZP, Bittnar Z, Jirásek M, Mazars J (eds), E.& F.N. Spon, London, 1994.

Clifton RJ, Klopp RW. Pressure-shear impact testing. In: *Metals Handbook, Vol. 8, 9<sup>th</sup> Edition*. ASM International, Metals Park, OH, 1985.

## **Presentations and Published Abstracts**

Klopp RW, Curran DR, Shockey DA, Cooper T. A comminution model for penetration in ceramics. Proceedings, 14<sup>th</sup> U.S. Army Symposium on Solid Mechanics, Chou SC, Iyer K (eds), Myrtle Beach, SC, October 16–18, 1996.

Giovanola JH, Klopp RW, Touzé P. Microdamage observations in dynamically fractured Ti-10V-2Fe-3Al microstructures and preliminary modeling attempts. Proceeding, IUTAM

Symposium on Micromechanics of Plasticity and Damage of Multiphase Materials, Pineau A, Zaoui A (eds), Sèvres, France, August 29–September 1, 1995, Kluwer Academic Publishers, Dordrecht, 1996.

McGinn JT, Klopp RW, Shockey DA. Deformation and comminution of shock-loaded  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> in the Mescall zone of ceramic armor. Proceedings, Materials Research Society 1994 Fall Meeting, Symposium on Grain-Size and Mechanical Properties—Fundamentals and Applications, Grant NJ, Armstrong RW, Otooni MA, Baker TN, Ishizaki K (eds), Materials Research Society, Pittsburgh, PA, 1995.

Kirkpatrick SW, Curran DR, Erlich DC, Klopp RW. Three-dimensional analyses of plate impact experiments with circular and star geometries. In: Shock Waves in Condensed Matter, Proceedings, APS '91 Topical Conference, Williamsburg, VA, Schmidt SC, et al. (eds). Elsevier, New York, NY, 1992.

Giovanola JH, Klopp RW, Simons JW. Effect of shear lips on dynamic crack propagation. In: Dynamic Fracture, Proceedings, OJI International Seminar on Dynamic Fracture, , Toyohashi, Japan, August 1–4, 1989.

Giovanola JH, Klopp RW, Shockey DA, Werner AT. Effect of microstructure and loading rate on the fracture behavior of Titanium–10V–2Fe–3Al. In: Advances in Fracture Research, Proceedings, 7th International Conference on Fracture (ICF7), Houston, TX, March 20–24, 1989.

### **Prior Experience**

Research Engineer, SRI International Poulter Laboratory, 1987–1999  
Postdoctoral Fellow, SRI International Poulter Laboratory, 1986–1987

### **Professional Affiliations**

- American Society of Mechanical Engineers
- SPIE—The International Society for Optical Engineering
- ASM International—American Society for Metals
- American Water Works Association
- Society of Manufacturing Engineers

## **Deposition/Trial Testimony**

### **Depositions**

*Kent Basso and Robin Basso v Shamrock Materials of Novato, Inc., et al.*, Superior Court of the State of California for the County of Marin, Case No. CV 061576, November 2008.

*VSM Group AB v Brother International Corporation*, United States District Court for the District of New Jersey, Case No. 07-CV-02553 (FLW/TJB), June 2008.

*Northern Insurance Company of New York v Cummins, Inc., et al.*, Superior Court of the State of California for the County of Los Angeles, Case No. NC041801, February 2008.

*Safeco Insurance Company of America v Emerson Electric Co., et al.*, United States District Court for the Northern District of California, Case No. C-05-00133 JF/HRL, March 2007.

*Tamra Williams-Jordan v Safco Product Co., et al.*, Superior Court of the State of California, County of Sacramento, Case No. 02AS05926, October 2006.

*IRIDEX v Synergetics, Inc. and Synergetics USA, Inc.*, United States District Court for the Eastern District of Missouri, Eastern Division, St. Louis, Case No. 4:05CV1916 CDP, October 2006.

*Raymond Hoffmaster v Sandpoint Design, Inc., et al.*, Superior Court of California, County of San Bernardino, Case No. RCV 080977, August 2005.

### **Arbitrations**

*Methods Machine Tools, Inc. v West Irving Die Casting, Inc.*, Case No. 51 181 Y 02020 05, American Arbitration Association Large and Complex Case Panel, Chicago, IL, December 11-15, 2006.

*Solios Thermal Ltd. v Spectro Alloys Corporation*, Case No. 50 110 T 00487 04, American Arbitration Association, 1663 Broadway, New York, NY, November 7-12, 2005.

### **Trials**

*KB's Express Transportation Services v The Braun Corporation*, Circuit Court for the State of Oregon, No. 0707-07662, July 2009.

*Lazare Kaplan International v Gemological Institute of America, et al.*, United States District Court for the Southern District of New York, Case No. 06 CV 4005 (TPG), February 2008.

*McWane, Inc., d/b/a Clow Valve Company v Chevron USA, Inc., et al.*, Iowa District Court for Mahaska County, Case No. LA074105, October 2008.