JULIAN RAPHAEL, Ph.D.

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Career Summary

Mechanical and electromechanical design with focus on analytical approaches to problem solving and project management. Creative, hands-on experience in Engineering, Manufacturing, and Management and expertise in the following:

- Engineering management
- Analysis and design of mechanical systems
- Stochastic modeling & probabilistic design
- Data acquisition & control
- Product design & development
- Nonlinear finite element analysis (Nastran)
- Fatigue modeling & failure analysis
- Laboratory development

Professional Experience

J R TECHNICAL SERVICES, LLC, Abingdon, Virginia (2009-Present)

Principal Engineer

Private consulting practice in the areas of metal fatigue, fracture mechanics, probabilistic failure analysis, mechanical design, impact, finite element modeling - linear statics, nonlinear statics, buckling, nonlinear transient (geometric and material), eigenvalue extraction, normal modes analysis.

COLUMBUS MCKINNON CORP., Damascus, Virginia (1991-2009)

Principal Mechanical Engineer/ Product Development Manager

Responsible for functional business plan implementation. This involved supervising new product development and the development test laboratory as well as serving as a member of the approval-for-sale committee and approving the disposition of all non-conforming material.

Major Accomplishments:

- Successfully developed company's first electric single-chain two-ton hoist
- Successfully developed and expanded low-cost, lightweight hoist product line
- Successfully developed and patented new manually operated lever hoist and overload protector
- Developed analytical dynamics models of hoist operation
- Developed stochastic models for life and strength prediction
- Introduced Geometric Dimensioning and Tolerancing (GD&T) to the design process
- Successfully developed quiet operating electromagnetic safety brake
- Designed and developed computerized clutch dynamometer
- Applied nonlinear finite element method to structural and dynamic analyses
- Wrote design control procedures for ISO 9001 registration
- Sales of developed products exceed $50,000,000
- Provided engineering support for materials management and quality assurance

ELASTIMOLD DIV. AMERACE CORP., Hackettstown, New Jersey (1983 to 1991)

Manager, Mechanical Engineering

Was responsible for managing the engineering model shop, supervising current transfer testing, and administering the CAD network. The position also included providing engineering support for product engineering, marketing, manufacturing, and purchasing. Supervisory responsibility was for a professional and technical staff of 6.

Major Accomplishments:

Developed fully automatic multitasking data acquisition laboratory for connector qualification
Designed microprocessor based machining center that saved in excess of $100,000 annually
Designed strain gage based force and torque transducers
Developed dynamic testing and high speed data acquisition systems

LUTRON ELECTRONICS, Coopersburg, Pennsylvania (1982 to 1983)

Mechanical Project Engineer

Performed thermal analyses of semiconductor heat sinks. This involved calculating time-temperature and heat flux histories. Designed compact high-current switch and developed tactile switch mechanism. Performed failure mode analysis of switch components.

WINCHESTER ENGINEERING, Roanoke, Indiana (1973 to 1982)

Manufacturing Engineer

Was responsible for the design of tools, jigs, and fixtures. This involved supervising machining activities, including automatic screw machines, lathes, milling machines, and gear hobbers.

EDUCATION

Ph.D., University of Tennessee, Knoxville, Tennessee
MSME, Lehigh University, Bethlehem, Pennsylvania
BSME, Purdue University, West Lafayette, Indiana
BA Mathematics, Adelphi University, Garden City, New York

ADDITIONAL INFORMATION

Graduate studies completed in analytical methods, elasticity, stochastic control, continuum mechanics, probabilistic methods, mechanical vibrations, computational mechanics, advanced dynamics, mechanical reliability, fracture mechanics, contact mechanics, nonlinear fracture mechanics, fatigue, viscoelasticity and creep. Member of Tau Beta Pi, Phi Kappa Phi and Purdue 500. Particular interests in multiaxial fatigue, stochastic modeling and multi-body dynamics. Thesis written on kinematics. Dissertation written on contact mechanics in layered media. Member of ASM's failure analysis committee (2006-2010). ASM 2004 chair of materials modeling and 2008 modeling and simulation technical sessions. ASM 2009 chair of gear and bearing failures technical session.

PUBLICATIONS

Raphael, J., Wang, G., Liaw, P., Senkov, O., Miracle, D., Fatigue and Fracture Behavior of a Ca-Based Bulk-Metallic Glass, *Metallurgical and Materials Transactions A*, 10.1007/s116661-009-0024-x, Springer Boston, 2009

Aliya, D., Raphael, J., Cracking Tendencies in Fillet Welds, *Journal of Failure Analysis and Prevention*, Vol 8, No 2, 2008

Raphael, J., A Plausible Strategy for Modeling Fatigue Life Variation, *Journal of Practical Failure Analysis*, Vol 3, No 3, 2003

Landes, J., Becker, W. T., Shipley, R., Raphael, J., Stress Analysis and Fracture Mechanics, *Failure Analysis and Prevention, Vol 11*, 11th edition, ASM, 2002

Raphael, J., Boulet, J. A. M., Failure Models in Hoisting Load Chain*, Journal of Practical Failure Analysis*, Vol 1, No 2, 2001

Raphael, J., Residual Stress, Shakedown and Failure in Carburized Hoisting Load Chain, *Ph.D. Dissertation*, University of Tennessee, 2000

RECENT INVITED TALKS

Characteristics of Impact Problems, Machinery Failure Prevention Technology Conference, Virginia Beach, Virginia, May 2011

Finite Element Analysis of Stresses in a Spherical Void in $Ca_{65}Mg_{15}Zn_{20}$ Bulk Metallic Glass, TMS Annual Conference, San Diego, CA, March 2011

Microstructures and Fatigue Behavior of Carburized Low-Carbon Steels*, TMS Annual Conference, San Diego, CA, March 2011

Fatigue and Fracture Behavior of a Calcium-Based Bulk Metallic Glass, MS&T Annual Conference, Houston, TX, October 2010

A Comparison of Constant and Variable Stiffness Beams Under Impact Loading, University of Tennessee Materials Science Fracture Group, Knoxville, TN, December 2010

Dynamic Stresses in High Frequency 4-Point Bending Fatigue Tests, University of Tennessee Materials Science Fracture Group, Knoxville, TN, October 2009

Dynamic Models of Hoist Operation, University of Tennessee Materials Science Graduate Seminar, Knoxville, TN, July 2009

The Comet Fatigue Failures of 1953-1954: A Historical Review, MS&T Annual Conference, Pittsburgh, PA, 2002

* Contributor