

PEC – PARNELL ENGINEERING & CONSULTING

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T. KIM PARNELL

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PROFESSIONAL PROFILE

Dr. Kim Parnell specializes in the mechanical engineering design and analysis of products and issues associated with their use. His engineering experience spans a broad range of physical components with dimensions ranging from micrometers up to kilometers in size. Investigations on the miniature scale include the behavior and characterization of implantable, biomedical devices, electronic and miniature components such as MEMs, and telecommunications equipment. At the large-component end of the physical size spectrum are applications such as vehicle crashworthiness, passenger safety, and accident investigation, explosions and blast damage, failure and collapse of structures due to seismic loading, chemical/process plant accidents, and analysis and design of piping systems, shell structures, and pressure vessels.

Dr. Parnell works extensively with both start-ups and established companies in the biotechnology and medical device industries to provide the resources needed to accelerate their internal R&D efforts and to understand and then correct product failures. He assisted with development and FDA qualification of numerous stent and stent-graft products, catheter based devices, vascular closure devices, and surgical instruments.

Dr. Parnell is an expert in the development and application of finite element analysis (FEA) techniques and computational analysis to solve real-world problems. He has over twenty years of project experience involving critical engineering skills such as fracture/fatigue, reliability, life testing, FMEA, FMECA, metallography, SEM inspection, failure analysis and forensic engineering. This expertise encompasses functional areas including R&D, QA, Operations/Manufacturing, and Process Development.

Dr. Parnell is actively involved in engineering education, mentoring, and training. He served as a Visiting Associate Professor in the Mechanical Engineering Department at Stanford University. Dr. Parnell is a coach and mentor for the innovative Stanford Biodesign curriculum. He developed a program to interest high school students in the process of innovation by exposing them to the engineering product design and development process. ASME awarded Dr. Parnell a K-12 educational grant to implement this program in conjunction with Homestead High School in Cupertino, CA. Dr. Parnell is actively involved in the development of courses and seminars for the continuing education and professional development of practicing engineers through ASME and IEEE.

Dr. Parnell often serves as a guest speaker at professional groups, secondary schools, and colleges to promote engineering. His experience in presenting technical information to lay audiences has proven useful when serving as an engineering expert for litigation and in clearly distilling/explaining the essential points. Dr. Parnell is actively involved in professional organizations such as ASME, WESCON, and IEEE, and non-profit groups such as the Digital Clubhouse Network (DCN) and CSIX Connect (CSIX). He is on the executive steering committee for CSIX and was instrumental in the project to obtain 501(c)3 non-profit status for this dynamic group of over 1600 members. Dr. Parnell is an active participant in the Biomedical Device Group (BDG), Resources, Marketing, and IT Departments at CSIX. In 2003, Dr. Parnell joined *NanoBioConvergence* (NBC) and is a member of the executive committee for this cutting edge organization. Dr. Parnell is Industrial Relations Chair for the ASME Santa Clara Valley Section (SCVS) and also a member of the IEEE Consultants' Network of Silicon Valley.

Dr. Parnell is Principal and Founder of PEC and Vice President of Operations for Blootech. Prior to founding PEC to provide independent consulting services, Dr. Parnell was Director of R&D for Rubicor Medical, and a Senior Managing Engineer at Exponent Failure Analysis Associates (FaAA). At FaAA,

he assumed responsibility for the Engineering Analysis Group and the Engineering Computer Center. Prior to joining FaAA, Dr. Parnell held other engineering and product development positions. He was employed by SST Systems, Inc. (a Silicon Valley startup) as a Principal Engineer in the Pressure Vessels, Piping & Structures Division. He was a Research Assistant in the Mechanical Engineering Department at Stanford University. Early in his career, Dr. Parnell gained experience in development and manufacturing of high-volume telecommunications and automotive products through his positions with Bell Telephone Laboratories in the Physical Design Group, and General Motors Corporation in Plant Engineering.

Dr. Parnell's current research activities include medical device development, shape memory materials, MEMs and sensors, wireless technology, applications of nanotechnology (particularly nanobiotechnology), and simulation of manufacturing processes. His wide-ranging product experience and network of technical contacts are of great benefit to both new and continuing clients.

EDUCATION & HONORS

Ph.D., Mechanical Engineering, Stanford University

M.S., Mechanical Engineering, Stanford University

B.E.S., Engineering Science & Mechanics, Georgia Institute of Technology (with Highest Honors)

Phi Kappa Phi, Tau Beta Pi, Phi Eta Sigma honorary societies

Beta Theta Pi Fraternity (Georgia Tech fraternity with a long-standing tradition of excellence;)

Bell Laboratories Award (for the ESM Senior with the top academic ranking), Georgia Tech

General Motors Corporation Scholarship (one of ten Georgia Tech recipients of full scholarships in the initial year of this program), Georgia Institute of Technology

Beta Theta Pi Founder's Fund Scholarship, Georgia Institute of Technology

Bell Laboratories Graduate Study Program, Stanford University

Professional Development:

Certified Reliability Engineer (CRE) Training

Marketing, Patent Law, Business Development, Mentoring, Team Building, & Project Management

Hazardous Waste Operations and Emergency Response Training, 29 CFR 1910.120

Reliability of Semiconductor Capital Equipment

Advanced Nonlinear Finite Element Analysis Tools and Techniques

Computational Fluid Dynamics (CFD) Applications in Process Design

PROFESSIONAL EXPERIENCE

BLOOTECH, INC.

PEC - PARNELL ENGINEERING & CONSULTING

RUBICOR MEDICAL, INC.

EXPONENT FAILURE ANALYSIS ASSOCIATES

STANFORD UNIVERSITY

SST SYSTEMS, INC.

AT&T BELL LABORATORIES

GENERAL MOTORS CORPORATION

MOFFETT FIELD, CA

SUNNYVALE, CA

REDWOOD CITY, CA

MENLO PARK, CA

STANFORD, CA

SUNNYVALE, CA

INDIANAPOLIS, IN

ATLANTA, GA

Registered Professional Mechanical Engineer, State of California (#M25550)

Professional Affiliations:

American Society of Mechanical Engineers (ASME)

Institute of Electrical and Electronics Engineers (IEEE)

IEEE Consultants' Network of Silicon Valley (CNSV)

Association for the Advancement of Medical Instrumentation (AAMI)

American Society for Engineering Education (ASEE)

NanoBioConvergence (NBC)

CSIX Connect (CSIX)

Medical Device Network (MDN), Stanford University
The BioDevice Group (BDG)
Chinese American Semiconductor Professional Association (CASPA)

Reviewer:

International Journal of Solids & Structures
Computer Methods in Applied Mechanics & Engineering

U.S. Citizen; Previously held DoD Secret Clearance

SELECTED PRESENTATIONS

- “CFD Fundamentals and Applications in Biotechnology”, ASME Professional Development Seminar, 2003.
- “Medical Device Business Opportunities in China”, multiple presentations to key government and industry representatives, CASPA Delegation, October 2003.
- “Using Simulation with Testing for Maximum Benefit”, WESCON 2003, Low Cost Tools: Alternatives for Problem Solving in Development, Design and Application, San Francisco, CA, August, 2003.
- “Fracture Mechanics: Overview and Applications”, Aeronautics & Astronautics Department, Stanford University, May 1999.
- “Integrated Fluid/Thermal/Structural Analysis of a Turbine Blade,” American Society of Mechanical Engineers Bay Area Technical Conference, May 1995.
- “Failure Analysis Projects,” Mechanical Engineering Department, Stanford University, May 1992.
- “Finite Element Applications in Failure Analysis,” Mechanical Engineering Department, Stanford University, March 1991.
- “Soil-Pipeline Interaction Associated with a Process-Plant Explosion,” Seminar in Solid Mechanics, Stanford University, November 1989.
- “Typical Failures: Causes and Consequences,” Construction Engineering and Management Program, Civil Engineering Department, Stanford University, 1989.
- “Shell Analysis Using Personal Computers,” Solid Mechanics Seminar, Stanford University, 1985.

SELECTED PUBLICATIONS

- “Finite Element and Fatigue Analysis of CardioVasc Stent Graft”, CardioVasc, Inc., 2004.
- “Analysis of Rail Cracking and Development of a Rail Screening Guideline Based on Fracture Mechanics Principles,” Fatigue & Durability Assessment of Materials, Components & Structures, Proceedings of the Fifth International Conference of the Engineering Integrity Society, Queen's College, Cambridge, UK, April 7-9, 2003.
- “Finite Element and Fatigue Analysis of CP Stent Expansion”, NuMed, Inc., 2003.
- “Evaluation of a Failure in a Chlorine Production Facility,” Proceedings of IMECE 2001, ASME International Mechanical Engineering Congress and Exposition, November 2001, New York, NY (with S. Andrew, R. Caligiuri, and L. Eiselstein).
- “Physical Testing for Good Analysis: Experimental Validation for Quality Finite Element Analysis of Medical Devices”, feature article for *ANSYS Solutions*, Fall 2000 (Machine Design Custom Media, Penton Media, Inc.).
- “Finite Element Simulation of 180° Rollover for Heavy Truck Vehicles,” ASCE Engineering Mechanics Conference, Baltimore, MD, June 1999 (with Christopher V. White and Shari E. Day).
- “Finite Element Analysis of the S670 Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1999.
- “Finite Element Analysis of the S660 Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1999.
- “Finite Element Analysis of the Six Crown Extra Support Renal Stent – Minimum Dimensions”, Arterial Vascular Engineering, Inc., 1998.
- “Finite Element Analysis of the SVG Stent”, Arterial Vascular Engineering, Inc., 1998.
- “Finite Element Analysis of the GFX-II Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1998.

- “Analysis of Drill Pipe Joint Failures and Recommendations For Service,” Failure Analysis Associates, Inc. Report, November 1997 (with R.D. Caligiuri, L.E. Eiselstein, M. Wu, R. Huet).
- “Finite element Analysis of the GFX Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1997.
- “Stress Analysis: AVE MicroStent-II Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1997.
- “SAE Report CRP-12 Heavy Truck Crashworthiness – Phase II (180° Dynamic Rollover, Static Roof Crush Simulation),” SAE Headquarters, 1997.
- “Heavy Truck 180° Dynamic Rollover and Static Roof Crush Simulation,” Failure Analysis Associates, Inc. Report, April 1996 (with C. White, S. Day, T. Khatua, and L. Cheng).
- “Fracture Toughness by Small Punch Testing,” *Journal of Testing and Evaluation*, Vol. 23(1), pp. 3-10, January 1995 (with J. R. Foulds, P. J. Woytowicz and C. W. Jewett).
- “Safety Analysis of Custom Designed Manufacturing Equipment,” Proceedings, American Society of Mechanical Engineers Winter Annual Meeting, Safety Engineering and Risk Analysis, New Orleans, Louisiana, November 1993, Vol. 1, pp. 111 (with G. L. Rao and R. D. Caligiuri).
- “American Azide Corporation Reactor and Dryer Safety Studies,” Failure Analysis Associates, Inc. Report, January 1993 (with G. L. Rao, V. B. Rao, and R. D. Caligiuri).
- “Combustion Tests on and Chemical Analysis of Therminol 66 Heat Transfer Fluid Used at American Azide,” Failure Analysis Associates, Inc. Report, 1993 (with A. Reza and R. D. Caligiuri).
- “Gas Release from Leaky Natural Gas Pipeline: The PEPCON Explosion in Henderson, Nevada,” Failure Analysis Associates, Inc. Report, 1992 (with A. Reza, M. El-Fadel and R. D. Caligiuri).
- “Computational Modeling of Dynamic Failure in Armor/Anti-Armor Materials,” Failure Analysis Associates, Inc. Final Report to U.S. Army Research Office, Contract DAA-L03-88-C-0029, May 1992
- “Analysis of Cracking in the Windsor Recovery Boiler Superheater,” Failure Analysis Associates, Inc. Report to Domtar, Inc., April 1992 (with R. D. Caligiuri, C. H. Lange and S. P. Andrew).
- “Analysis of the Dynamic Response of a Buried Pipeline due to a Surface Explosion,” *Computational Aspects of Impact and Penetration*, L.E. Schwer and R.F. Kulak, eds., Elme Press International, 1991 (with R. D. Caligiuri).
- “Failure Analysis of Aerzen Screw Compressor Male Thrust Bearings,” Failure Analysis Associates, Inc. Report to AECI Chlor-Alkali & Plastics, Ltd., September 1991 (with C. C. Schoof).
- “Gas Flow and Heat Transfer in a Pipe Tee Joint,” Failure Analysis Associates, Inc. Report to Chevron Corporation, November 1990 (with R. D. Caligiuri and A. Reza).
- “Development of Dynamic Failure Criteria for Ceramic Armor Materials,” Failure Criteria and Analysis in Dynamic Response Symposium, ASME Winter Annual Meeting, Nov.1990, H.E. Lindberg, ed.
- “DYNA3D Analysis of the Dynamic Response of a Buried Pipeline due to a Surface Explosion,” DYNA3D User Group Conference, Bournemouth, Dorset, United Kingdom, September 1990.
- “Con Edison Hellgate Facilities Gas Main Rupture,” Failure Analysis Associates, Inc. Report to Consolidated Edison Company of New York, Inc., February 1990.
- “Stress and Fracture Mechanics Analysis of Weld Cracking in a Rotary Ball Mill,” American Society of Mechanical Engineers Winter Annual Meeting, Paper 89-WA/DE-17, San Francisco, California, December 1989 (with C. A. Rau, Jr., H. F. Wachob and E. L. Kennedy).
- “Analysis of the Plunger-to-Plunger Rod Joint in an Automotive Fuel Injector,” Failure Analysis Associates, Inc. Report to Hitachi, Ltd., October 1988 (with P. R. Johnston and B. Ross).
- “Analysis of the Circumferential Seam Weld Cracking of Raw Grinding Mills,” Failure Analysis Associates Report to Kaiser Cement Corporation, November 1986 (with C.A. Rau, Jr., H.F. Wachob).
- “Local Flexibility and Stresses in Cylindrical and Spherical Shells Due to External Loadings on Nozzles and Lug Attachments,” A.F.I.A.P. Conference, Paris, France, October 1986.
- “Analysis of Piping Systems with Local Nozzle Flexibility Using Personal Computers,” American Society of Mechanical Engineers Pressure Vessel and Piping Conference, New Orleans, LA, 1985.

“Numerical Improvement of Asymptotic Solutions and Nonlinear Shell Analysis,” Ph.D. dissertation, Stanford University, June 1984.

“Numerical Improvement of Asymptotic Solutions for Shells of Revolution with Application to Toroidal Shell Segments,” *Computers & Structures*, Vol. 16, No. 1-4, 1982.