Kenneth P. Maynard
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EDUCATION AND PROFESSIONAL REGISTRATION

Master of Engineering in Acoustics, Penn State University
Bachelor of Science in Mechanical Engineering, University of Florida
Licensed Professional Engineer
Master of Divinity, Columbia International University

SYNOPSIS OF SKILLS

- Design and research project management
- Shock and vibration testing and analysis
- Finite element analysis (ANSYS, STRUDL, others)
- Computational Fluid Dynamics (CFD) modeling (CFX)
- Field mechanical troubleshooting of operating systems by testing and analysis
- Development of test and analysis techniques and procedures
- Sound measurement and noise reduction
- Flow-induced vibration analysis
- Pressure vessel/piping analysis, ASME VIII and ASME III, Class 1, 2, and 3
- Seismic qualification of piping, equipment, structures
- Development of special purpose finite element and other computer programs
- Computer applications (see Page 2)

EXPERIENCE

- November, 2008 to present: R&D Engineer, Penn State Applied Research Lab
  - ◊ Finite element modeling of gear ausforming process
  - ◊ Finite element modeling of jet impingement heat transfer for VTOL aircraft
  - ◊ Computational Fluid Dynamics modeling of jet impingement
- August, 2002 to November, 2008: Research Engineer, Penn State Applied Research Lab (part-time)
  - ◊ Reactor Coolant Pump shaft crack detection (EPRI)
  - ◊ Signal processing of projectile impact accelerations and forces (STFT, wavelets)
  - ◊ Finite element modeling of gear ausforming process
  - ◊ Finite element modeling of dynamics of impact and friction on expeditionary airfield (EAF) aluminum mat
  - ◊ Finite element modeling of jet impingement heat transfer for VTOL aircraft
  - ◊ Finite element modeling of airfoil leading edge heat transfer of impregnated coatings
- August, 2002 to November, 2008: Pastor, Clove Valley Alliance Church
- August, 2001 to August, 2002: Part-time instructor – Mechanical Engineering Dept., Penn State University
  - ◊ Mechanical Vibration
  - ◊ Machine Design
- August, 1997 to August, 2002: Research Engineer, Penn State Applied Research Lab, Condition Based Maintenance Dept.
  Reference: Dr. Karl Reichard (814-863-7681)
  - ◊ Principle Investigator for the following CBM research projects:
    - § Integrated Predictive Turbine engine machinery diagnostics, IMATE consortium (DARPA/GE)
    - § Sensors and signal processing for the Multi-Disciplinary University Research Initiative (Co-PI) (ONR)
    - § Centrifugal Charging Pump Gearbox Smart Sensor Development (EPRI)
    - § NERI Smart Equipment for Nuclear Power Plants (DOE)
    - § Aircraft engine disk cracking (NASA Glenn/GE)
    - § Reactor Coolant Pump Shaft Crack Detection (EPRI)
    - § Prognostics and Health Management Research (Sandia National Laboratories)
    - § Turbine blade and shaft crack detection research (Southern Company)
    - § Wind tunnel fan blade cracking (NASA Ames)
  - ◊ Developed interstitial processing algorithms for identification of gear tooth and shaft faults
- August, 1989 to August, 1997 - Southern Company Services: Senior Engineer, Consulting Services (Applied Mechanics).
  Reference: David L. McKinney (205-992-7036)
  - ◊ Vibration troubleshooting of operating systems by testing and analysis

- ◊ Rotordynamic analysis of pumps and turbines
- ◊ Modal testing of piping and equipment
- ◊ Sound and vibration signal processing
- ◊ Seismic qualification of equipment and piping (hand calcs. and finite element)
- ◊ Seismic verification of equipment based on earthquake experience (SQUG SRT member)
- ◊ Finite element analysis of equipment and structures (stress, dynamics, thermal)
- ◊ Oversaw project for seismic qualification of piping based on earthquake experience
- ◊ Noise reduction (community and in-plant)
- ◊ Technical focus for ANSYS analysis
- ◊ OSHA evaluation of plant noise

- February, 1988 to August, 1989 - Civil Engineering of Columbia: Reference: Bill Brown (803-798-2820)
- October, 1987 to December, 1987 - Adjunct faculty, Columbia Bible College
- September, 1984 to August, 1987 - Full-time student, Columbia Biblical Seminary
- March, 1982 to December, 1984 - President, SLI Engineering
  - ◊ Consulting engineer at Babcock and Wilcox, Utility Power Generation Division: References: Dr. M. K. Au-Yang (804-385-2000)
    - § Steam generator tube vibration analysis, including random turbulent, fluidelastic instability, and vortex shedding
    - § Flow induced vibration analysis of internal header structure, including vortex shedding, random, and flutter
    - § Flow induced vibration analysis of miscellaneous reactor and steam generator internals
    - § Data reduction and analysis of Control Rod Drive vibration test data
  - ◊ Contract engineer at Burns and Roe, Oradell, NJ:
    - § ASME Section III, Class 1 Piping analysis
- November, 1980 to March, 1982 - Design-Engineer I, Duke Power Company, Design Engineering Department. Reference: WH Scheffler (Retired)
  - ◊ Supervisor, Operations Analysis Group
    - § Failure analysis, dynamic testing and analysis of operating systems
    - § Developed pre-operational/startup vibration criteria for piping systems
    - § Developed finite element program for critical speed analysis of shafts
- September, 1979 to June, 1981 - Instructor, University of North Carolina at Charlotte, College of Engineering, sequence of undergraduate courses, "Dynamics of Linear Circuits and Systems"
- May, 1978 to November, 1980 - Engineer Associate, Duke Power Company, Design Engineering Department. Reference: WH Scheffler (Retired)
  - ◊ Supervisor, Special Stress and Dynamic Analysis Group
    - § Directed low-level seismic testing of safety related valves
    - § Directed vibration troubleshooting of operating systems
    - § Developed Finite Element code for qual. (ASME III) of instrument. lines, vents, drains
    - § Performed generic study of effects of support flexibility on seismic loads and stress
- May, 1976 to May, 1978 - Eng. Asst., Duke Power Company, Design Engineering Department, Stress Anal. Group. Reference: WH Scheffler (Retired)
    - § Developed low-level seismic testing program for over fifty safety related valves. Responsibilities included feasibility study, specification of test equipment, development of test procedures, director of testing, and development of final report
    - § Performed multi-linear dynamic analysis of pipe whip energy absorber test structure
    - § Vibration testing and analysis of operating equipment
    - § Developed computer program for evaluation of equipment anchoring systems
    - § Stress analysis of piping, equipment, and structures I/A/W ASME III

COMPUTER EXPERIENCE

- Finite Element Programs Used: ANSYS, STRUDL, NASTRAN, STARDYNE, SUPERPIPE, ADLPIPE
- Computational Fluid Dynamics: CFX
- Languages: MATLAB, FORTRAN, BASIC, SPL
- Other Applications: Fluent with all MSOffice products (also other word processors and spreadsheets)
- Programs Written: hundreds for stress and dynamic analysis of structures, equipment, pressure vessels and piping

TECHNICAL SOCIETIES

ASME Sub-committee on Vibration of Heat Exchanger Internals - former member

PERSONAL: Married, one son Nathanael (18 years old), daughter Kedrah (11 years old)

PUBLICATIONS:

- C. J. Lissenden, S. P. Tissot, M. W. Trethewey and K. P. Maynard, *Torsion Response of a Cracked Stainless Steel Shaft,* Fatigue & Fracture of Engineering Materials and Structures, August 2007, Vol. 30, Issue 8, Page 673-782.
- Thornton, William R., Trethewey, Martin W., Maynard, Kenneth P., Sadler, James, *MRI Isolation System Design for a Severe Vibration Environment*, Sound and Vibration Magazine, December, 2006.
- Resor, B.R., Trethewey, M.W., Maynard, K.P., *Compensation for Encoder Geometry and Shaft Speed Variation in Time Interval Torsional Vibration Measurement*, Journal of Sound and Vibration, Vol. 286, 22 September 2005, pp. 897-920, 2005.
- Garrett, Phillip W., Guindon, Edward J., Trethewey, Martin W., Lebold, Mitchell S., Maynard, Kenneth P., *Shaft Crack Monitoring via Torsional Vibration Analysis; Part 2 – Field Applications* 2005 International Modal Analysis Conference, Orlando, FL, January 31 - February 3, 2005.
- Bieryla, Dennis J., Trethewey, Martin W., Lissenden, Clifford J., Lebold, Mitchell S., Maynard, Kenneth P., *Shaft Crack Monitoring via Torsional Vibration Analysis; Part 1 – Laboratory Tests* 2005 International Modal Analysis Conference, Orlando, FL, January 31 - February 3, 2005.
- Lebold, M. S., Maynard, K. P., Reichard, K, Trethewey, M., Bieryla, D., Lissenden, C., Dobbins, D., *Using Torsional Vibration Analysis as a Synergistic Method for Crack Detection in Rotating Equipment,* 2004 IEEE Aerospace Conference, Big Sky, MT, March 6-13, 2004.
- Groover, C. L., Trethewey, M. W., Maynard, K. P., Lebold, M. S., *Removal of Order Domain Content in Rotating Equipment Signals by Double Resampling,* IMAC-XXII, International Modal Analysis Conference, Dearborn, Mi, Jan. 26-29, 2004.
- Yildiz, B.; Golay, M.; Maynard, K. P., Maghraoui, M., *Development of a Hybrid Intelligent System For On-Line Monitoring of Nuclear Power Plant Operations*, 2002 PSAM 6 (Probabilistic Safety Assessment and Management) Conference, San Juan, Puerto Rico, June 23–28, 2002.
- Kacprzynski, G. J; Roemer, M. J.; Byington, C. S.; Modgil, G. A.; Palladino, A; Maynard, K. P., *Enhancing Gear Physics-of-Failure Models with System Level Vibration Features*, Proceedings of the 56th Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, April 15-19, 2002.
- Kacprzynski, G. J; Roemer, M. J.; Modgil, G. A.; Palladino, A; Maynard, K. P., *Enhancement of Physics-of-Failure Prognostic Models with System Level Features*, 2002 IEEE Aerospace Conference, Big Sky, MT, March 9-16, 2002.
- Maynard, K. P., and Trethewey, M. W., *Blade and Shaft Crack detection Using Torsional Vibration Measurements Part 3: Field Application Demonstrations*, Noise and Vibration Worldwide, Volume 32, No. 11, December 2001, pp. 16-23.
- Maynard, K.; Trethewey, M.; Gill, R.; Resor, B., *Gas Turbine Blade and Disk Crack Detection Using Torsional Vibration Monitoring: A Feasibility Study,* Proceedings of 14th International Congress and Exhibition on Condition Monitoring And Diagnostic Engineering Management (COMADEM), 4-6 September 2001, University of Manchester, UK.
- Yildiz, B.; Golay, M.; Maynard, K. P., Maghraoui, M., *Development of Expert System with Bayesian Networks for Application in Nuclear Power Plants*, 2001 EPRI International Maintenance Conference, Houston, TX, August 14-16, 2001.
- Maynard, K. P., Trethewey, M. W., *Application of Torsional Vibration Measurement to Blade and Shaft Crack Detection in Operating Machinery*, Maintenance and Reliability Conference, Gatlinburg, Tennessee, May 6-9, 2001.
- Harmon, D. L.; Golay, M. W.; Campbell, J. E.; Duran, F. A.; Maynard, K. P.; Spencer, J. W, *Developing "Smart" Equipment and Systems Through Collaborative Neri Research and Development: A First Year Of Progress*, Maintenance and Reliability Conference, Gatlinburg, Tennessee, May 6-9, 2001.
- Harmon, D. L.; Golay, M. W.; Campbell, J. E.; Duran, F. A.; Maynard, K. P.; Spencer, J. W, *Wising Up to Get Smart*, Nuclear Engineering International, May, 2001.

- Maynard, K. P., Trethewey, M. W., Groover, C., *Application of Torsional Vibration Measurement to Shaft Crack Monitoring in Power Plants*, Proceedings of the 55th Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, April 2-5, 2001.
- Maynard, K. P., and Trethewey, M. W., *Blade and Shaft Crack detection Using Torsional Vibration Measurements Part 2: Resampling to Improve Effective Dynamic Range*, Noise and Vibration Worldwide, Volume 32, No. 2, February 2001, pp. 23-26.
- Maynard, K. P., and Trethewey, M. W., *Blade and Shaft Crack detection Using Torsional Vibration Measurements Part 1: Feasibility Studies*, Noise and Vibration Worldwide, Volume 31, No. 11, December, 2000, pp. 9-15.
- Harmon, D. L.; Chapman, L. D.; Golay, M. W.; Maynard, K. P.; Spencer, J. W, *Developing "Smart" Equipment and Systems Through Collaborative Neri Research and Development: A First Year Of Progress* , Basin Nuclear Conference, Seoul Korea, October 29-November 2, 2000.
- Begg, C. D.; Byington, C. S.; and Maynard, K. P, *Dynamic Simulation of Mechanical Fault Transition*, Proceedings of the 54th Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, May 1-4, 2000, p. 203-212.
- Lebold, M.; McClintic, K.; Campbell, R.; Byington, C.; Maynard, K., *Review of Vibration Analysis Methods for Gearbox Diagnostics and Prognostics*, Proceedings of the 54th Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, May 1-4, 2000, p. 623-634.
- McClintic, K.; Lebold, M.; Maynard, K.; Byington, C.; Campbell, R., *Residual and Difference Feature Analysis with Transitional Gearbox Data*, Proceedings of the 54th Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, May 1-4, 2000, p. 635-645.
- Maynard, K. P.; Lebold, M.; Groover, C.; Trethewey, M., *Application of Double Resampling to Shaft Torsional Vibration Measurement for the Detection of Blade Natural Frequencies*, Proceedings of the 54th Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, May 1-4, 2000, p. 87-94.
- Reichard, Karl M.; Van Dyke, Mike; Maynard, Ken, *Application of sensor fusion and signal classification techniques in a distributed machinery condition monitoring system*, Proceedings of SPIE - The International Society for Optical Engineering Apr 25-Apr 28 2000, p 329-336.
- Harmon, D. L.; Chapman, L. D.; Golay, M. W.; Maynard, K. P.; Spencer, J. W, *Developing "Smart" Equipment and Systems Through Collaborative NERI Research and Development*, Korean Nuclear Society/Korea Atomic Industrial Forum, Seoul, Korea, April 19-21, 2000.
- Begg, C.; T. Merdes, C. S. Byington, and K. P. Maynard, *Mechanical System Modeling for Failure Diagnosis and Prognosis*, Maintenance and Reliability Conference (MARCON 99), Gatlinburg, Tennessee, May 10-12, 1999.
- Maynard, K. P.; and M. Trethewey, *On The Feasibility of Blade Crack Detection through Torsional Vibration Measurements*, Proceedings of the 53rd Meeting of the Society for Machinery Failure Prevention Technology, Virginia Beach, VA, April 19-22, 1999, pp. 451-459.
- Maynard, K. P.; *Interstitial Processing: The Application of Noise Processing to Gear Fault Detection*, Proceedings of the International Conference on Condition Monitoring, University of Wales Swansea, UK, 12th - 16th April 1999, pp. 77-86.
- Maynard, K. P.; *Validation of Helicopter Nominal and Faulted Conditions Using Fleet Data Sets*,, Proceedings of the International Conference on Condition Monitoring, University of Wales Swansea, UK, 12th - 16th April 1999, pp. 129-141.
- Au-Yang, M. K.; Maynard, K. P., *Guidelines for the Reduction of Random Modal Test Data*, Proceedings of the International Modal Analysis Conference & Exhibit VI 1985, p 384-389.