

CONTINUING EDUCATION SHORT COURSE

Machinery Vibration and Rotordynamics *Formerly run by Bearings Plus Inc.*

January 13-17, 2014 • Houston, TX



TURBOMACHINERY LABORATORY
TEXAS A&M ENGINEERING EXPERIMENT STATION



Machinery Vibration and Rotordynamics

January 13-17, 2014 • DoubleTree by Hilton Houston Hobby Airport • Cost: \$3,300 • CEU Credits: 3.0

Online Registration is open now through January 10, noon Central Standard Time.

On-site registration available: open January 13, 7:00 a.m. - 9:00 a.m. CST. Payment must be made at on-site registration with a credit card (only); we accept MC, Visa & AMEX.

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Course Description

The course will begin with a practical approach to understanding basic vibration theory and using it to solve mechanical vibration problems. Rotordynamics terminology in common use will be defined and explained, including critical speeds, the critical speed inversion, unbalance response, and rotordynamic instability. The influence of rotordynamics on different types of turbomachinery design will be illustrated. Case studies of rotordynamic instability and critical speed problems will be presented. The occurrence and importance of backward whirl will be explained. Causes of bearing problems and failures will be described. Several new seals and bearing dampers with significant damping and stabilizing properties will be described. The following topics in rotordynamics will be covered: force coefficients for bearings, seals, impellers, turbine wheels, and squeeze film dampers; troubleshooting oil film bearings, the finite element and transfer matrix methods for rotordynamic analysis, building realistic rotordynamic computer models, making computer models agree with measurements.

Who Should Attend

The course offers concepts and techniques to engineers involved in design, operation, and maintenance of rotating equipment. Participants should have some experience with rotating machinery. For sessions of vibrations analysis and computer simulation, a Bachelor's degree or equivalent knowledge of basic college-level mathematics is assumed.

Course Instructors

Dr. Dara Childs (Texas A&M Turbo Lab)

Dr. Dara Childs holds the Leland T. Jordan Chair of Mechanical Engineering. Before joining TAMU, he taught at The University of Louisville and Colorado State University. He started his professional career at Rocketdyne working on the F1 and J2 engines for the Apollo program, where he worked actively in resolving problems related to the engines of the SSME. He has continued to work steadily for over 50 years on rotordynamic issues related to rocket-engine turbopumps and commercial turbomachinery. He is the author or co-author of numerous journal papers on rotordynamics plus the heavily-cited 1993

book, Turbomachinery Rotordynamics; Phenomena, Modeling and Analysis. His new book, Turbomachinery Rotordynamics with Case Studies, was released in the fall of 2013.

Dr. Brian Murphy (RMA, Inc.)

Dr. Brian Murphy is conducting research at the Center for Electromechanics (CEM) in Austin, Texas, focusing on advanced electromechanical rotating machinery, including ultra-high energy motors and generators and high-speed flywheel batteries. Prior to his appointment at CEM he was involved in the development of advanced turbomachinery for liquid rocket engines while employed at Rocketdyne. Dr. Murphy has developed rotordynamics algorithms and software (XLRotor™) that are widely used by rotating machinery engineers in industry.

Dr. Luis San Andrés (Texas A&M Turbo Lab)

Dr. Luis San Andrés leads the Tribology Group at the TAMU Rotordynamics Laboratory and has conducted independent research in fluid film bearings, squeeze film dampers and seals for turbomachinery since 1990. Luis San Andrés has made enduring contributions to the technology development of hybrid fluid film bearings for applications in primary power space turbopumps. His research includes the analysis and experimental validation of hybrid thrust bearings and two-phase fluid seals for cryogenic applications. In recent years, NSF has awarded him grants for the analytical modeling and experimental validation of fluid film bearings operating with air entrainment and also to develop the scientific basis and engineering design of gas bearings for oil-free turbomachinery.

Dr. John M. Vance (VAVCO)

Dr. John M. Vance retired in 2007 from Texas A&M University where he was Professor of Mechanical Engineering and carried out research on rotordynamics, bearing dampers, and damper seals in the Turbomachinery Laboratory. He received his B.S.M.E. (1960), M.S.M.E. (1964), and Ph.D. (1967) degrees from The University of Texas at Austin. He has published more than 75 technical articles and reports on rotordynamic instability, squeeze film bearing dampers, damper seals, vibration isolators, and related subjects. His book, Rotordynamics of Turbomachinery (John Wiley, 1988) has sold more than 3,000 copies and is used by engineers around the world. His latest book, Machinery Vibration and Rotordynamics (John Wiley, 2010), is co-authored by Drs. Zeidan and Murphy. Dr. Vance is an active consultant to industry and government. He is an inventor on several patents relating to rotating machinery and vibration reduction. His patented "TAMSEAL" has been retrofitted to solve vibration problems in a number of high-pressure industrial compressors. Dr. Vance served on the Advisory Committee for the Turbomachinery Symposium from 1983-2007; he is an ASME Fellow, and a registered professional engineer in the State of Texas.

Dr. Fouad Zeidan (Fouad Zeidan Consulting)

Dr. Fouad Zeidan is an independent consultant and previously President/owner of KMC/Bearings Plus, Inc. Prior to KMC/Bearings Plus, he held positions at Amoco Research Center, IMO Industries CentriMarc Division, and Qatar Fertilizer where he worked in maintenance and trouble shooting of rotating machinery, bearing design and failure analysis, vibration and rotordynamic analysis. Dr. Zeidan holds nine U.S. Patents for integral squeeze film dampers and high performance journal and thrust bearings. He has published more than 30 technical papers and articles on various turbomachinery topics. Dr. Zeidan holds B.S., M.S., and Ph.D. degrees from Texas A&M University.

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For questions contact: Bethany Womack: bwomack@turbo-lab.tamu.edu • 979.845.8943

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