ROTOR DYNAMICS & BEARINGS TECHNOLOGIES FALL SEMINAR

NOVEMBER 3-7, 2025

ONLINE OR IN PERSON, FRANKFURT, GERMANY

WHO SHOULD ATTEND

This course is designed for engineers and technical managers who are involved in rotating machinery design, operation, maintenance, diagnostics, and troubleshooting, with emphasis on bearings and bearings systems, machinery rotor dynamics, and drive train torsional vibration.

WHAT WILL YOU LEARN

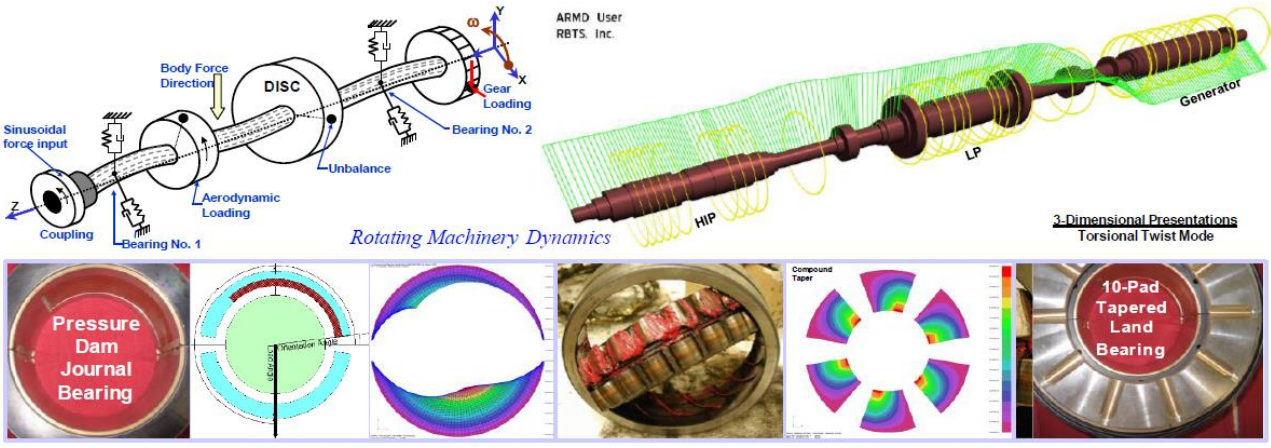
This seminar provides detailed coverage of the field of fluid-film bearings and rotor dynamics including the presentation of case histories and the application of advanced software for modeling, analyses, and troubleshooting real-life bearing systems and vibration problems encountered in rotating equipment.

FLEXIBLE REGISTRATION

DAY 1	MON	NOV 3, 2025	FLUID-FILM BEARINGS
DAY 2	TUES	NOV 4, 2025	ROTOR DYNAMICS, PART 1
DAY 3	WED	NOV 5, 2025	ROTOR DYNAMICS, PART 2
DAY 4	THU	NOV 6, 2025	TORSIONAL VIBRATION
DAY 5	FRI	NOV 7, 2025	SOFTWARE WORKSHOP AND APPLIED EXAMPLES OF REAL-WORLD APPLICATIONS (in-person only) ARMD™ software demonstration, training, and application to bearings, bearing systems, rotor dynamics, and torsional vibration modeling, analyses, and interpretation of generated results.

No previous experience is required.

Each student will receive a certification of completion reflecting earned CEU.



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In-Person Student

REGISTER NOW
Online Student

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ABOUT THE COURSE

The course is designed for engineers and technical managers who are involved in rotating machinery design, operation, maintenance, diagnostics, and troubleshooting, with emphasis on vibration analysis including the influence of bearings that support, guide, and locate the rotating assembly.

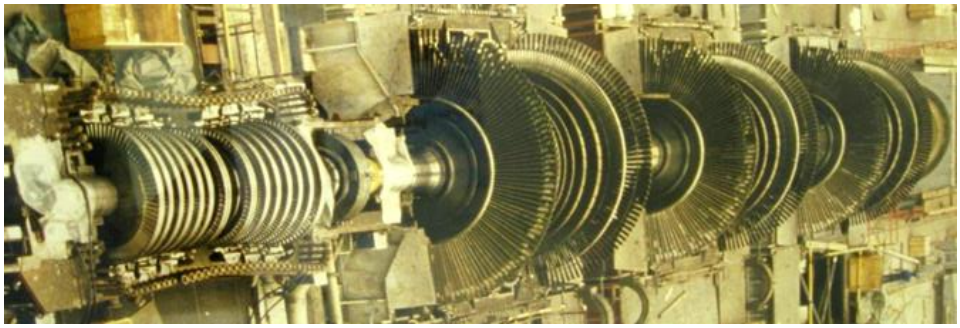
The first session will focus on FLUID-FILM BEARINGS, the vital tribological element of rotating machinery, beginning with their fundamental principles of operation through computer-implemented evaluations of their operational performance characteristics and limitations. Design considerations and applications of fluid-film bearings will be discussed along with the presentation of numerous real-life case histories to illustrate the technology and its application to rotating machinery failure analysis and troubleshooting of common as well as unique vibration problems.

The second session will focus on ROTOR DYNAMICS PART 1. The interacting influence of bearings on the dynamic behavior of rotating machinery will be reviewed and illustrated by the construction of analytical models and evaluated by computerized solutions. Participants are encouraged to present problems to be discussed. Informal technical sessions and workshops are intended to provide participants with adequate time to describe problems they have encountered in bearings, bearing systems, rotor dynamics, and torsional vibration.

The third session deals specifically with ROTOR DYNAMICS PART 2 as they occur in complete drivelines. Apart from model generation strategies, we present the basics of the analysis of excitability including the interpretation of vibration modes of the drive system. Examples show the steady-state or time-transient response signals generated by the calculations and in comparison with measurement signals.

The fourth session addresses TORSIONAL VIBRATIONS including case studies and applications in rotating machinery supported by computer simulation methods. This course is recommended as an additional session to the previous days. Complete drivelines are analyzed and evaluated concerning excitability and response capability at specific stations (inertias) and elements (stiffnesses).

The fifth session offers SOFTWARE WORKSHOP AND APPLIED EXAMPLES OF REAL-WORLD APPLICATIONS. ARMD™ software demonstration, training, and application to bearings, bearing systems, rotor dynamics, and torsional vibration modeling, analyses, and interpretation of generated results. We will create computer models, demonstrate how to run reasonable computations, and explain how to interpret the computer results. This training covers real industrial case studies.



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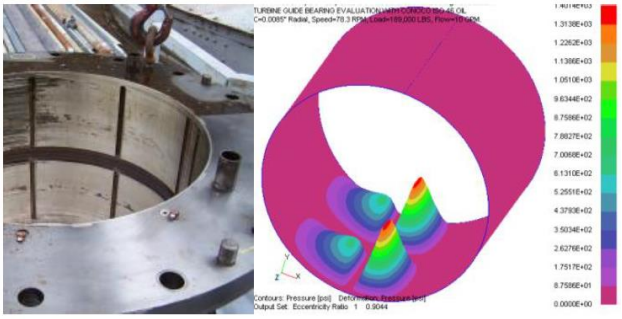
DAY 1 FLUID-FILM BEARINGS

This seminar is presented in a simple way to understand the technology of sliding surface bearings so that participants with or without previous knowledge benefit from the presentation and can apply it immediately in their profession.

The session is a full coverage of fluid-film bearings (the vital tribological elements of rotating machinery that support, guide, and locate the rotating assembly) beginning with their fundamental principles of operation through computer-implemented evaluations of their operational performance characteristics and limitations. Design considerations and applications of sliding surface bearings with emphasis on hydrodynamically lubricated fluid-film bearings will be discussed along with presentations of practical examples and case histories.

INTRODUCTION TO BEARINGS

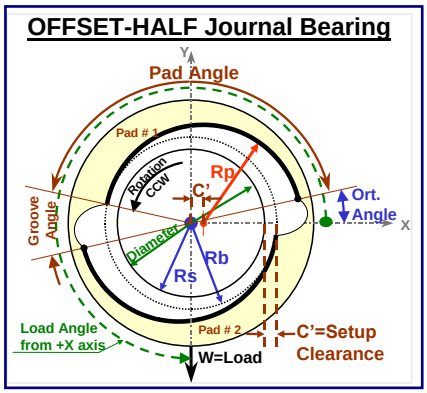
- Functional roll
- The two primary classes
- Noteworthy differences between classes of bearings



Hydro-turbine guide bearing & oil pressure model

SLIDING SURFACE BEARINGS

- Fundamentals
- Types and definitions
- Load support mechanisms
- Modes of lubrication
- Frictional response characteristics
- Terms and concepts of hydrodynamic lubrication and its requirements
- Terms and concepts of hydrostatic-hybrid lubrication and its requirements
- Lubricant temperature / viscosity dependent properties and heat balance effects
- Turbomachinery hydrodynamic bearing types, performance, and dynamic characteristics
- Oil whirl / whip
- Advantages / disadvantages
- Costs



FLUID-FILM BEARING TYPES AND APPLICATIONS

- Fixed and tilting pad geometries
- Journal, thrust & conical

BEARINGS STATE-OF-THE-ART TECHNOLOGY

- Advanced technology presentation and demonstration
- Summary of course content and application of bearings technologies
- Group discussion

DAYS 2 & 3 ROTOR DYNAMICS, PART 1 and ROTORDYNAMICS, PART 2

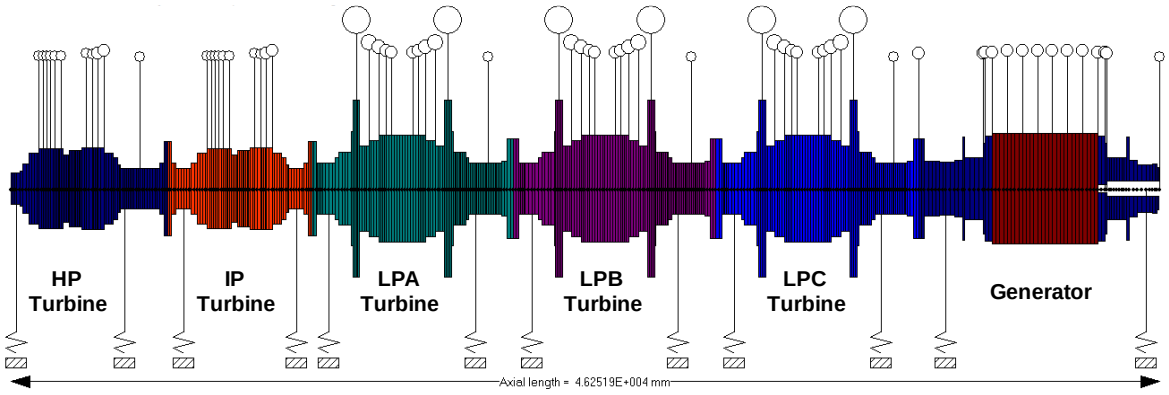
These sessions present rotordynamics in a simple way so that participants with or without previous knowledge benefit from the presentation and can apply it immediately in their profession. Commonly used terminology in the industry such as critical speed, mode shapes (rigid body and bending), stability, bearing whirl/whip, phase angle, critical damping, gyroscopic effects, unbalance, API amplification factors, and required separation margins, etc. will be discussed and illustrated throughout the course by the presentation of practical examples and case histories. The course handout includes sufficient details to be used as a reference including a tutorial section on rotor dynamic fundamentals and terminology. Part 2 covers advanced applications in rotor dynamics and lateral vibrations.

INTRODUCTION & OVERVIEW

(includes the presentation of a real-life vibration problem and cost/time-effective corrective actions taken as a solution)

ROTOR DYNAMICS INTRODUCTION & APPLICATION

- Basics of machinery vibrations
- Response and shaft dynamics: displacement, velocity, acceleration, amplitude and phase
- Forces in rotating machinery, bearings, cavitation, imbalance, hydraulic, aerodynamic
- Basics and application of rotor dynamics
- Shaft dynamics and response controlling mechanisms and balancing
- Modeling: shafting, disks (impellers, couplings, thrust collars, blades, balanced pistons, etc.), bearings (fluid-film and rolling element), seals (wear-rings, labyrinth), housing/pedestal, aerodynamic, steam whirl, hydraulic effects, external excitations, gyroscopic effects
- Analysis: damped and undamped rotor stability, natural frequencies, mode shapes, stability and critical speed maps, and responses



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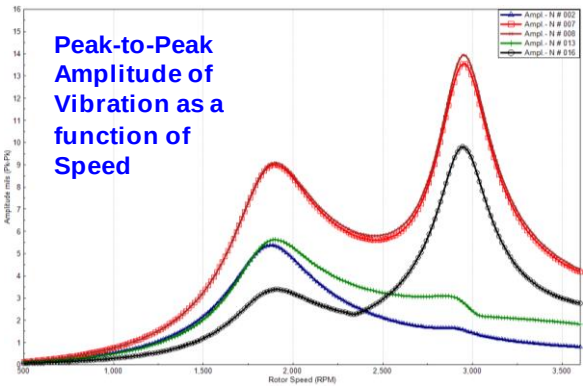
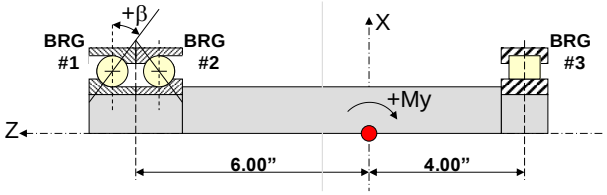
ROTOR DYNAMICS – ADVANCED

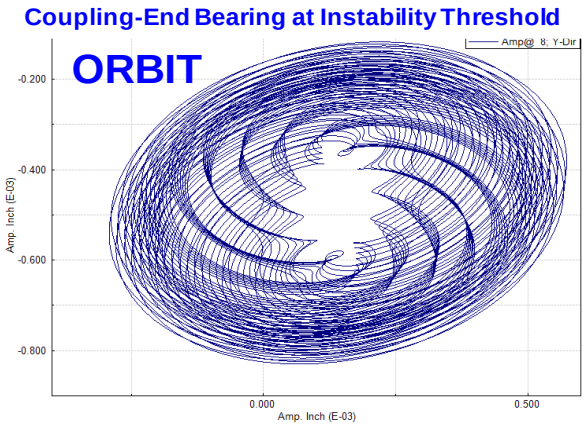
- Synchronous steady-state response
- Non-synchronous time-transient response
- Balancing grades and guidelines
- API standards and guidelines: amplification factor, critical response envelope. Required separation margins for operation below and above critical speed, shaft vibration orbit properties



ROTOR DYNAMICS DETAILED CASE HISTORY

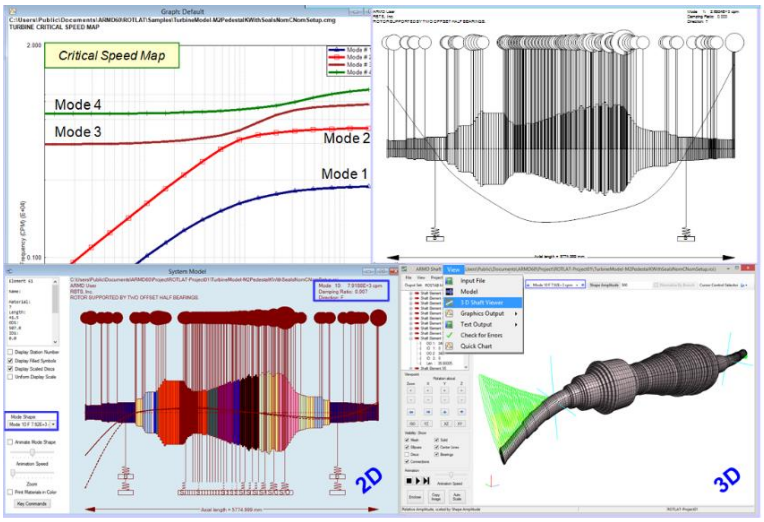
- Step-by-step rotor-bearing system modeling, analysis, and problem solution by the introduction of rotor dynamics software and its application to a rotor-bearing system
- Bearing Interaction with the rotating assembly, oil-whirl/whip phenomena, rotor-bearing response, and stability illustrations





STATE-OF-THE-ART TECHNOLOGY PRESENTATION & DEMONSTRATION

- Advanced technology presentation and demonstration
- Summary of course content and application of rotating machinery dynamics technologies



During the session, numerous real-life case histories will be presented to illustrate the technology and its application to rotating machinery failure analysis and troubleshooting of common, as well as unique vibration problems.

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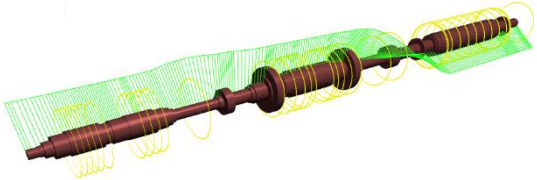
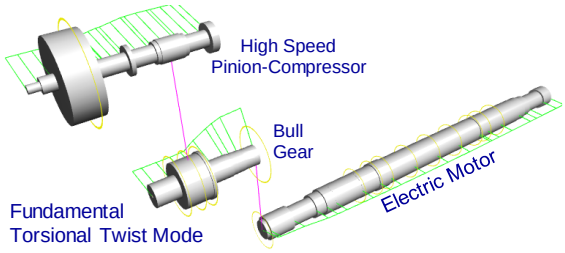
DAY 4 TORSIONAL VIBRATION

This session will give interested participants more depth into the basics of torsional vibrations including case studies and applications in rotating machinery supported by computer simulation methods. This course is recommended as an additional session to the previous days. Complete drivelines are analyzed and evaluated concerning excitability and response capability at specific stations (inertias) and elements (stiffnesses).
The following subjects are covered:



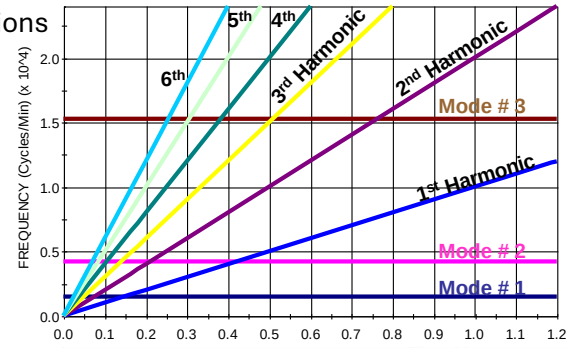
MODEL GENERATION

- Introduction and problem description
- Getting the "right" parameters
- Model structures of complete drivelines
  (including motors, engines, couplings, gears, universal shafts)



ANALYSIS OF EXCITABILITY

- Natural frequencies
- Modes and interpretation of system sensitivity, Model refinement
- CAMPBELL diagram and discussion of relevant excitations

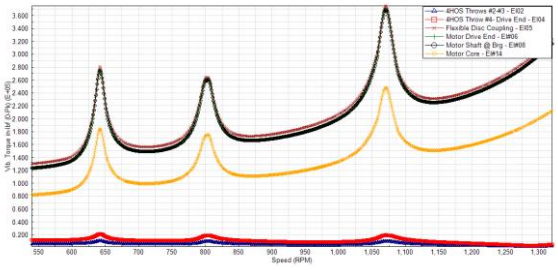


SIMULATION METHODS

- Simulation in the time domain (time-transient)
- Simulation in the frequency domain (steady-state)
- Analysis of the system response and discussion of case studies

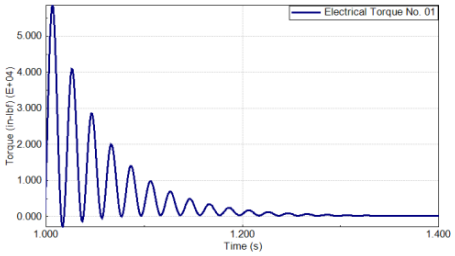
SYSTEM EVALUATION

- Evaluation methods and sensitivity analysis methods
- Correlation with measurements
- Identification of dynamic effects and machine diagnosis
- Planning further steps towards system optimization



APPLICATIONS

- TVA (torsional vibration analysis) of a total drive system
- Drivelines with motors, engines, and reciprocating compressors
- Electrical effects (start-up, short circuits, synchronous motor dynamics)
- Nonlinear system behavior, influence of non-linear effects
  (gear dynamics, friction hystereses, rubber influence in flexible couplings, backlash and impacts, etc.)
- Presentation of computer results and demonstration of case studies



DAY 5 ARMD™ SOFTWARE WORKSHOP AND APPLIED EXAMPLES OF REAL-WORLD APPLICATIONS (in-person only)

This workshop is planned for participants who are interested in using specialized software tools for the detailed modeling and analysis of bearings and rotor/bearing systems (in this case, the ARMD software package). Participants can bring their rotating machinery and bearing problems to be presented and discussed in an open session, watch a problem development and solution, or use the software and create their own models and perform the analysis of their interest. Time will be allocated to discuss FAQs and details of the ARMD software. The workshop will cover the following subjects:

MODEL GENERATION

- Introduction and problem description
- Getting the "right" parameters
- Dividing the rotating machine into components for modeling and integration
- Verification of constructed models

ROTOR/BEARING SIMULATION

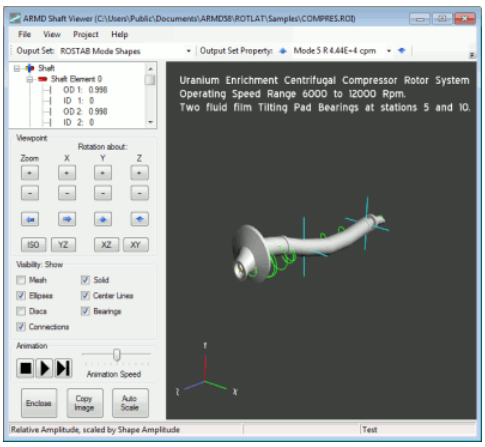
- Deflection and load calculations
- Bearing performance and the generation of dynamic coefficients
- System natural frequency, mode shapes and stability calculations
- Critical speed map generation
- Stability map (CAMPBELL diagram)
- Synchronous unbalance response
- Non-synchronous time transient response

INTERPRETATION OF RESULTS

- Acceptable bearing performance
- Rotating machinery dynamic performance and cost-effective corrective action
- Comparison/correlation of calculated and measured machinery dynamic performance

MORE DETAILED APPLICATIONS

- Participants' problems *(if available and can be shared)*
- Group/instructor sample problem(s)
- Special TVA applications



ABOUT YOUR INSTRUCTORS

VICTOR K. OBEID has over 35 years of experience in the fields of rotor dynamics, fluid-film and rolling-element bearings, machinery vibration, failure analysis, and troubleshooting.

He is a pioneer in the development and application of PC-based state-of-the-art computer-aided design software for predicting the dynamics of complex rotor-bearing systems. A former Staff Engineer at the Franklin Institute Research Laboratories and a technical leader at *RBTS*, he directs government and industry-sponsored projects involving the design, analysis, and troubleshooting of rotating machinery systems and their components. He has been instrumental in teaching and training in the fields of bearings and rotor dynamics, and their application to common as well as unique equipment design, operation, and failure analysis. He taught seminars and training sessions worldwide at rotating equipment OEM, end users, packagers, government agencies, and open seminars to machinery engineers.

Mr. Obeid holds a Bachelor's degree from Drexel University and a Master of Science degree from Penn State University, both in Mechanical Engineering, as well as numerous US & Canadian patents on bearing designs & machinery elements.

DR. ANDREAS LASCHET has more than 40 years of experience in the area of torsional vibrations and has been a teaching partner for this seminar since 2004. As part of his consultation services, Dr. Laschet has carefully investigated CAE methods and simulation algorithms for creating torsional vibration models of complete drivelines and performed detailed studies to verify computer results with measurements.

Dr. Laschet has published more than 60 technical papers and given numerous lectures at international conferences such as VDI, HDT, EFRC, ASME, and SAE. He studied Mechanical Engineering at the University of Technology in Aachen and carried out research work in the field of machine dynamics as a scientific assistant at the Institute of Machine Elements. His thesis "*Development of a method for the computer supported simulation of torsional vibrations in drive systems*" was published in 1988 as a Springer book "*Simulation of the Dynamic Behaviour of Drive Systems*" (in German language).

THOMAS GRESHAM has extensive experience in delivering structural analysis, rotordynamics, bearing analysis, seal design, and test planning in addition to teaching sections for Concepts NREC's advanced turbomachinery engineering training courses.

He brings additional compressor design and rotordynamics engineering experience from his roles as a Compressor Design Engineer at Daikin Applied, a Rotordynamics Engineer at Xdot Engineering & Analysis, and as a Rotordynamics Engineer at Pratt & Whitney in Connecticut.

Mr. Gresham holds B.S. and M.S. degrees in Mechanical Engineering from the University of Virginia, specializing in rotordynamics and vibrations.