MeTec
EMPWER YOUR TECHNICAL SKILLS

ADVANCED

MACHINERY DYNAMICS

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ADVANCED MACHINERY DYNAMICS

OVERALL DESCRIPTION:

The performance and reliability of your rotating and reciprocating machinery are directly tied to your bottom line. The difference between operational excellence and costly downtime lies in a deep, proactive understanding of machinery dynamics. This course is designed to move your team beyond reactive maintenance and into the realm of predictive, strategic asset management. We'll provide the specialized knowledge and advanced diagnostic skills needed to not only prevent failures but also to optimize performance, increase efficiency, and secure your competitive edge. Participants will gain the confidence to lead diagnostics, make informed decisions, and champion a culture of reliability.

Course Objectives:

Upon completion of this course, participants will have the knowledge and skills to:

- Master advanced rotor modeling techniques to accurately predict machinery behavior.
- Identify and diagnose complex malfunctions such as rotor-to-stator rubs, fluid-induced instabilities, and shaft cracks.
- Apply various balancing methods, including influence vectors and modal balancing, to mitigate vibration issues.
- Effectively measure and analyze torsional vibration and its impact on machine trains.
- Utilize impact testing and advanced signal processing to determine component natural frequencies and structural integrity.
- Formulate and implement targeted corrective actions based on a deep understanding of machine dynamics, reducing recurring failures.

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Course Outline:

- **Rotor Dynamics & Modeling:** Understanding critical speeds, natural frequencies, and the effects of anisotropic systems.
- **Advanced Balancing Techniques:** In-depth exploration of static, coupled, modal, and influence vector balancing methods.
- **Complex Malfunction Diagnostics:** Detailed analysis of rub events, shaft crack detection, and fluid-induced instability mechanisms.
- **Torsional and Structural Vibration:** Principles of torsional excitations, measurement techniques, and the relationship between structural and rotor vibration.
- **Impact Testing and Modal Analysis:** Practical application of impact testing to identify structural modes and inform maintenance decisions.
- **Real-World Case Studies and Problem-Solving:** Applying course knowledge to practical, field-based scenarios using diagnostic data.

WHO SHOULD ATTEND?

This course is designed for experienced professionals seeking to advance their skills beyond basic machinery diagnostics. Ideal participants include:

- Reliability, Maintenance, and Rotating Equipment Engineers.
- Machinery Analysts and Condition Monitoring Specialists.
- Technical Managers and Supervisors responsible for asset health.
- Consultants involved in root cause analysis and equipment performance optimization.

Course Methodology:

We utilize a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. This training course will be conducted as a highly interactive workshop session. A variety of training methodologies will be used Before and during the course whenever applicable. Some of these methods are gamification, online pre-post test, role plays, self-assessment instruments, group exercises & case studies.