

APPLIED VIBRATION ANALYSIS

The global provider of **ISO 18436-1** and **ISO 18436-2** compliant training and certification in Vibration Analysis.



APPLIED VIBRATION ANALYSIS



Applied Vibration Analysis CAT I

Begin your journey to becoming a vibration specialist with this course that empowers you to deliver accurate, reliable data and gain a solid understanding of condition monitoring, vibration theory, and fault analysis following **ISO 18436-1** and **ISO 18436-2**.



Applied Vibration Analysis CAT II

Deepen your expertise to become a senior vibration analyst with advanced training in vibration analysis, digital signal interpretation, and precision maintenance aligned with **ISO 18436-1** and **ISO 18436-2** to elevate your skills and confidence in condition monitoring.



Applied Vibration Analysis CAT III

Become a vibration analysis specialist through advanced training in signal processing, waveform analysis, and fault diagnostics-covering resonance, isolation, and complex failures-aligned with **ISO 18436-1** and **ISO 18436-2** to advance your skills.



Applied Vibration Analysis CAT IV

Advance your vibration expertise through focused training in analysis, auditing, and advanced applications, including modal analysis, natural frequency evaluation, and rotor dynamics-aligned with **ISO 18436-1** and **ISO 18436-2** for professional growth.

The SPM Academy Certification & Accreditation Center is currently seeking accreditation through the ANSI National Accreditation Board. Accreditation ensures that certification meets independent, internationally recognized standards.

SPM ● ● ●
ACADEMY
CERTIFICATION CENTER

APPLIED VIBRATION ANALYSIS **CAT I**

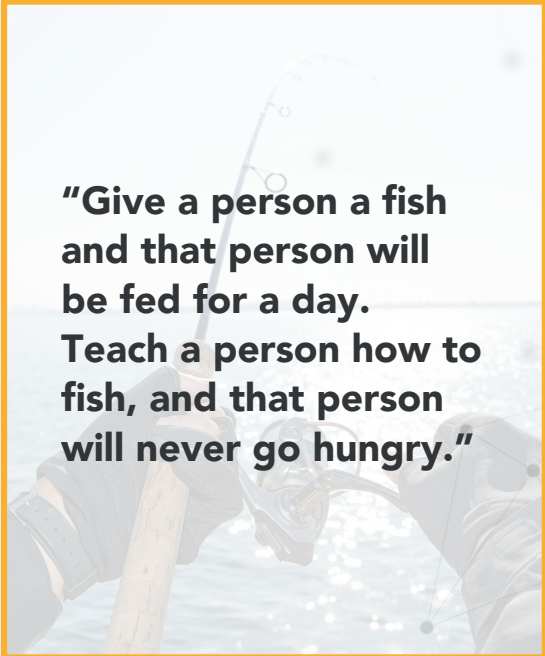
Begin your journey to becoming a vibration specialist with this course that empowers you to deliver accurate, reliable data and gain a solid understanding of condition monitoring, vibration theory, and fault analysis following **ISO 18436-1** and **ISO 18436-2**.

The purpose of this training is to empower you to deliver safe, reliable, and accurate vibration data. Upon completion of this course, you will become a key contributor to the field of vibration analysis and condition monitoring.

This course is designed to motivate you to go beyond the basics—to expand your understanding and skills beyond those of the average condition monitoring technician.

Guided by the **ISO 18436-1** and **ISO 18436-2** standards, this program will educate you on:

- What condition monitoring is
- Condition monitoring technologies
- An Introductory to vibration theory
- Data capturing fundamentals
- Basic fault analysis
- Fundamental knowledge of specific components and equipment



**"Give a person a fish
and that person will
be fed for a day.
Teach a person how to
fish, and that person
will never go hungry."**

This course embodies the philosophy of teaching a person to fish — rather than simply providing data or answers, it will teach you how to understand, interpret, and act on vibration data with confidence and precision.

TRAINING DELIVERY METHODS

Classroom Training

Face-to-face, instructor-led sessions in your own language featuring live demonstrations, animations, and simulators for an immersive learning experience, delivered either as public sessions at hotel venues or on-site at your plant facility.

Virtual Training

Live, instructor-led sessions via Teams, Zoom, or similar platforms that let you learn from home and avoid travel costs. Available as public or private, company-specific sessions.

E-Learning Training

Self-paced, web-based video courses offering unmatched flexibility to learn anytime, anywhere, and at your own pace—helping you achieve your professional goals faster.

APPLIED VIBRATION ANALYSIS CAT I

Foreword

- Basic mathematics
- Changing the subject of a formula
- Cross multiplication
- Exponents

Chapter 1 – Introduction

- What is condition monitoring?
- Creating value from condition monitoring
- Reliability
- Risk management
- Making a difference
- Understanding failure
- Understanding maintenance types and philosophies
- Understanding mean time between failures (MTBF)
- Making a difference
- Optimization

Chapter 2 – CM Technology

- Vibration analysis
- Device categories
- Vibration transducers
- Transducer mounting options
- Thermography
- Tribology
- Ultrasound
- Electrical testing
- Motion amplification
- Process monitoring
- Non-destructive testing

Chapter 3 – Vibration Theory

- What is vibration?
- What do we measure?
- Single degree of freedom (SDOF)
- Time domain (Waveform)
- Amplitude
- Frequency
- Phase
- Complex motion (MDOF)
- Frequency domain (Spectrum / FFT)
- Associated terminology and considerations for application
- Frequency domain
- Waveform patterns and the Fourier transform
- Natural frequencies

Chapter 4 – Capturing Data

- Process flow overview
- Safety
- Testing procedure
- Condition monitoring equipment care
- Naming conventions
- Mounting
- Routes
- Transferring routes
- Challenges with transferring of routes
- Challenges during route capturing
- Observations
- Bad data

APPLIED VIBRATION ANALYSIS **CAT I**

Chapter 5 – Fault Analysis

- Presenting data
- Basic data analysis
- Specific faults
 - Unbalance
 - Looseness
 - Misalignment
 - Bearings

Chapter 6 – Equipment Knowledge

- Bearings
- Couplings
- Gearboxes
- Electric motors
- Pumps and fans
- Compressors
- Rolling/paper mills
- Structures and piping
- Machine tool spindles

Glossary of Equations Application Notes



ISO Category I certification exam, conducted online, on the last day of classroom training courses, or as an independently invigilated exam at a time of your choice.

Eligibility for certification:

- Pass the SPM Academy CAT I certification exam,
- Complete an SPM Academy approved Vibration Analysis Category I training course,
- Have at least 6 months of practical experience in vibration data collection or analysis.

Candidates who meet the certification requirements will be certified through the SPM Academy Certification Center and be recognized as a Certified Category I Vibration Analyst. They will receive a digital certificate and a personalized digital badge.

Certification is valid for 5 years.



APPLIED VIBRATION ANALYSIS **CAT II**

Deepen your expertise to become a senior vibration analyst with advanced training in vibration analysis, digital signal interpretation, and precision maintenance aligned with **ISO 18436-1** and **ISO 18436-2** to elevate your skills and confidence in condition monitoring.

Congratulations on challenging yourself to reach a higher level of competence in the field of vibration analysis.

As the second installment in your journey to becoming a vibration specialist, this course invites you to develop a deeper understanding of the key principles, tools, and applications that define vibration science.

Guided by the **ISO 18436-1** and **ISO 18436-2** standards, this program builds on your foundational knowledge to prepare you for intermediate-level analysis and specialized applications in the field.

It is expected that participants are already proficient in data collection and possess a solid grasp of basic vibration theory, along with an eagerness to expand their technical knowledge and analytical skills.

Course Topics

- Intermediate vibration theory
- Digital signal analyzer fundamentals
- Site survey guidelines
- Shaft centerline analysis introduction
- Natural frequency determination
- Precision maintenance principles
- Reporting fundamentals
- Intermediate component and equipment fault analysis

"Teach a person how to design a wheel from scratch, and that person will design you a wheel. But give a person a wheel that is already designed, and that person will design you a vehicle."

This course reflects that philosophy — it equips you not only to understand the tools of vibration analysis, but to apply them creatively and confidently in solving real-world problems.

TRAINING DELIVERY METHODS

Classroom Training

Face-to-face, instructor-led sessions in your own language featuring live demonstrations, animations, and simulators for an immersive learning experience, delivered either as public sessions at hotel venues or on-site at your plant facility.

Virtual Training

Live, instructor-led sessions via Teams, Zoom, or similar platforms that let you learn from home and avoid travel costs. Available as public or private, company-specific sessions.

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APPLIED VIBRATION ANALYSIS CAT II

Chapter 1 – Introduction

- Data flow and process flowchart
- Review of key concepts from CAT I course

Chapter 2 – Vibration Theory

- Basic motion (superposition)
- Artificial high peaks
- Transient vibration response
- Beat
- Time domain digitization
- Frequency domain calculation
- Relationship between waveform sampling rate and F_{max}
- Resolution
- Time domain resolution
- Frequency domain resolution
- Units of amplitude
- Characteristic of vibration
- Amplitude conversion
- Filtering
- Filter applications
- Aliasing
- Phase
- Phase relationship and units of measure
- How do we measure phase?
- Representing results from phase analysis
- Windows

Chapter 3 – DSA Fundamentals

- Analyzer types
- Portable Digital Signal Analyzer (DSA)
- Online vibration analysis
- Vibration transducers
- Displacement transducers
- Velocity transducers
- Accelerometer
- Calibration
- Triboelectric effect
- Mounting
- Data capturing recommendations
- Frequency domain setup method
- Frequency domain setup effects
- Time domain setup effects
- Setup decision tree

Chapter 4 – Site Survey

- Planning a survey
- Baseline
- Routes
- Acceptance testing

Chapter 5 – Shaft Centerline Introduction

- Orbit
- Centerline

APPLIED VIBRATION ANALYSIS CAT II

Chapter 6 – Natural Frequency

Intermediate

- What are natural frequency, resonance, and critical speed?
- Single degree of freedom (SDOF)
- Multi degree of freedom (MDOF)
- Resonance
- Critical speed
- Determining natural frequency
- Mathematical methods
- Bump test
- Transient analysis
- External excitation
- Solving resonance
 - Remove the excitation
 - Change the natural frequency
 - Application of damping
 - Dynamic absorbers
 - Isolation

Chapter 7 – Precision Maintenance

- Alignment
- Alignment equipment
- Alignment procedure
- Balancing
- Rigid and flexible rotors

- Methods
- Standards and tolerances
- Single plane balancing procedure
- No phase balancing procedure
- Reasons that a balancing attempt is unsuccessful

Chapter 8 – Reporting

- Standards
- Report components
- Routine analysis reporting
- Online reporting
- Acceptance test reporting
- Special investigations
- Follow-up
- Efficient analysis
- Alarms

Chapter 9 – Equipment Knowledge

- Motors (induction)
- Pumps and fans (basic)
- Gearboxes
- Compressors
- Structures and piping
- Rolling and paper mills
- High-speed rotors

Glossary of Equations Application Notes



ISO Category II certification exam, conducted online, on the last day of classroom training courses, or as an independently invigilated exam at a time of your choice.

Eligibility for certification:

- Pass the SPM Academy CAT II certification exam,
- Have at least 18 months of practical experience in vibration data collection and/or analysis,
- Complete an SPM Academy approved Vibration Analysis CAT I and CAT II training course, OR have at least 24 months of practical experience in vibration data collection and/or analysis in lieu of CAT I training.

Candidates who meet the certification requirements will be certified through the SPM Academy Certification Center and be recognized as a Certified Category II Vibration Analyst. They will receive a digital certificate and a personalized digital badge.

Certification is valid for 5 years.