

VCAT-IV Expert Vibration Analyst

ISO 18436-2 Category IV

Achieve the highest status as a vibration analysis professional – capable of handling any condition that may be presented, capable of performing any test, fully understanding flexible rotor machinery - with advanced 3D animations and interactive simulations that make everything easy to understand.

Congratulations on being ready to tackle the Mount Everest of vibration analysis. The good news is you are in the right place. We have developed an amazing set of 3D animations and simulations that even make the Category IV topics relatively easy to understand. Topics that were once only suitable for Ph.D's and math geniuses are now accessible to practical vibration analysts—as *it should be*.

There is a lot to learn. You are required to take 64 hours of training according to ISO 18436-2, but we provide over 80 hours with combined online learning and 5-day in person learning (including Day 5 optional certification exam).

When you are ready, you must attend the face-to-face course where the instructor will review the topics and take you through a series of “worked examples” until you feel ready for the exam.

This training process will ensure you understand the topics so that you can apply the techniques in your role as the expert vibration analysts.

This training process will also help you achieve the pinnacle of the vibration world - the ISO Category IV Vibration Analyst.

Like two courses in one

The topics are roughly broken into two groups:

1. There is an entire course that could be called “Category III on steroids.” Many of the topics you covered on Category III are covered again, but we go into more detail. Those topics include signal processing, dynamics, ODS, modal analysis, and so on.

2. And then the course goes into overdrive. Now you get into the topics that are unique to Category IV. You will learn about fluid film bearings and flexible rotors, including measurements with proximity probes, diagnosing a variety of fault conditions, and even balancing flexible rotors.

Mobius Institute™ animations and simulations to the rescue

Category IV does cover a lot of practical content, but there is a good dose of theory as well. It is the theory and the calculations that can intimidate many vibration analysts. But we have done our best to make it all understandable and achievable. We provide you with a long list of worked examples with clear explanations on how to perform the calculations. But we also have animations and simulations that let you understand exactly what is going on. Rather than abstract concepts that only Ph.D's feel comfortable with, you will be able to connect theory with reality because you will see it right there on the screen.

Once you complete the training, you can take the exam with confidence, and become certified to ISO 18436-2 Category IV via the internationally respected Mobius Institute Board of Certification [MIBoC]. The MIBoC certification is accredited to ISO/IEC 17024 - there is no higher standard. You will join thousands of other Mobius certified analysts around the world.

VCAT-IV Expert Vibration Analyst ISO 18436-2 Category IV

This course is intended for the vibration analyst who will:

- Have a minimum of 5 years of experience
- Have a senior role in the condition monitoring team, but you want to go beyond and truly reach the peak of the vibration world
- Be able to understand the measurements associated with critical turbomachinery and other fluid-film bearing machines
- Be able to do everything the Category III can do – only better!

WHAT WILL YOU GAIN FROM TAKING THIS COURSE?

There is a great deal to learn, but it will help you to perform your role with confidence. The topics covered in this course include:

- Advanced signal processing
- Cross channel measurements
- Dynamics (mass/stiffness/damping, natural frequencies, modes)
- Resonance testing (run-up/coast down tests, impact tests, ODS, modal analysis)
- Corrective action (flow control, resonance correction, isolation, and damping)
- Proximity probe and casing measurements
- Orbit and centerline plot analysis
- Rotor dynamics (natural frequencies, modeling)
- Journal bearings (design, fluid film instabilities)
- Flexible rotor balancing
- Torsional vibration

The key is that with the VCAT-IV course, you will transition from being a very good vibration analyst to a vibration super-hero!

VCAT IV FAST FACTS

Duration:

82 hours: Everything on video, then a 5-day course with exam

Format:

Expert Vibration Analyst (VCAT-IV) is a two part course. Part one is a distance learning online course. Part two is a public classroom instructor-led course. Life Long Learning (LLL), access is optionally available as an additional resource to distance learning course.

Compliance:

- Training and certification: ISO 18436-2
- Certification: ISO 18436-1, ISO/IEC 17024
- Training: ISO 18436-3

Exam:

- Five hours
- 60 multiple-choice questions, with calculations required
- 70% passing grade
- Can be taken online or in-person at the course

Certification requirements:

- Training course completed
- 60-months of vibration analysis experience, verified by an independent person
- Have previously been certified to VCAT-III by a MIBoC approved certification body
- Pass the exam
- Valid for 5 years

Pre-study:

You will have access to 52.5 hours of videos and materials

Post-study:

- Continue to access the Learning Zone for 4-months after the course
- Continue learning, without charge, on MOBIUS CONNECT® via WWW.MOBIUSCONNECT.COM





TOPICS COVERED – EXPERT ANALYST CATEGORY IV

- Principles of vibration
 - Vectors, modulation
 - Phase
 - Natural frequency, resonance, critical speeds
 - Force, response, damping, stiffness
 - Instabilities, non-linear systems
 - Torsional vibration
 - Instrumentation
 - Proximity probe operation, conventions, glitch removal
 - Shaft and casing measurements
- Signal processing
 - RMS / peak detection
 - Analog/digital conversion
 - Analog sampling, digital sampling
 - FFT computation
 - Filters: low pass, high pass, band pass, tracking
 - Anti-aliasing
 - Bandwidth, resolution
 - Noise reduction
 - Averaging: linear, synchronous time, exponential
 - Dynamic range
 - Signal-to-noise ratio
 - Spectral maps
- Fault analysis
 - Spectrum analysis, harmonics, sidebands
 - Time waveform analysis
 - Orbit analysis
 - Shaft centerline analysis
 - Transient analysis
 - Unbalance, bent shaft, cracked shaft, eccentricity, rubs, instabilities
- Fault analysis (continued)
 - Resonance and critical speeds
 - Turbomachinery
- Phase analysis
 - Transient analysis
 - Enveloping
 - Electric motor defects
 - Flow-induced vibration, aerodynamics, and liquids
 - General fault recognition
- Rotor/bearing dynamics
 - Rotor/bearing dynamics
 - Rotor characteristics
 - Rotor modeling (rotor, wheels, bearings, aerodynamic effects)
 - Bearing characteristics (fluid film bearings, housing, and supports, seals, couplings)
- Corrective action
 - Flow control
 - Isolation and damping
 - Resonance control
 - Low and high-speed shop balancing
 - Field balancing (single plane, two plane, static/couple, flexible rotor)

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TOPICS COVERED – EXPERT ANALYST CATEGORY IV

(Continued)

- Equipment testing and diagnostics
 - Impact testing
 - Forced response testing
 - Transient analysis
 - Transfer functions
 - Damping evaluation
 - Cross channel phase, coherence
 - Operating deflection shapes
 - Modal analysis

- Fault severity determination
 - Spectrum analysis
 - Time waveform analysis, orbit analysis
 - Severity charts, graphs and formula

- Reference standards
 - ISO
 - IEC
 - Relevant national standards



➤ **WILL I RECEIVE PRE-COURSE STUDY MATERIALS?**

Every registered student will receive an instructional email to finalize their course registration. They will also receive a link to their personal Learning Zone account. The account provides a digital version of the coursebook and also a series of folders containing movies. These movies are actual course videos, recorded in a studio, and contain the same content taught in the Instructor-led course the student is registered in. The Learning Zone account may be used for pre-course study materials, review during the course week, reference after the course, or used to re-take the course and re-sit your certification exam. The account is activated at the time the student registers for the course and expires 6 months after the close date of the course they will be attending.

➤ **MAY I TAKE ONE OF YOUR COURSES IF I AM NOT INTERESTED IN BECOMING CERTIFIED OR IF I HAVE INSUFFICIENT EXPERIENCE FOR CERTIFICATION?**

Yes, our courses are open to the public, regardless of experience. If you are involved in vibration analysis or rotating machinery in any capacity, such as sales, marketing, engineering, design, or reliability, you will come away with a far better understanding of how machines are monitored, how faults develop, and what can be done to determine what faults actually exist in a machine. All attendees receive certificates of completion. Candidates without sufficient experience will still receive a certificate if they pass the exam, but it will note that their experience was insufficient for ISO certification at the time.

➤ **AFTER I ATTEND YOUR COURSE AND TAKE THE EXAM, WHEN WILL I RECEIVE NOTIFICATIONS AS TO WHETHER I PASSED, AND WHEN WILL I RECEIVE MY CERTIFICATE?**

You will receive notification of your results 5-10 days after the exam has been received at our Australian office. If you have passed the exam and met all certification requirements, you will receive your Digital Certificate 10-15 days after your exam results notification email.

➤ **HOW LONG IS THE CERTIFICATION VALID?**

Vibration analysis certification is valid for five (5) years.

➤ **HOW DO I RENEW MY CERTIFICATION?**

We will endeavor to contact you before your certification expires, therefore it is important that you keep your TMS records up to date (TMS is the training management system you will use to register for the course and for certification). We recommend a best practice of utilizing a personal email address for certification communications, in case of a job change.





➤ **HOW DO I QUALIFY FOR RENEWAL?**

As per the standard, we do not require you to attend our conferences or take our courses, however, we hope you will take advantage of WWW.MOBIUSCONNECT.COM and the sites linked to MOBIUS CONNECT so that your knowledge remains current. These sites are free of charge. When it is time to renew your certification, we will ask you to nominate an independent person who can verify that you are still active as a vibration analyst. There will be a small fee to renew your digital certificate and to renew your certification status with the accreditation body.

➤ **WHAT ARE THE EXPERIENCE REQUIREMENTS FOR VCAT I?**

You must have six months of experience generally associated with maintenance, reliability, and vibration data collection. You will be asked to nominate an independent person who can verify that you have that experience.

➤ **WHAT ARE THE EXPERIENCE REQUIREMENTS FOR VCAT II?**

You must have 18 months of experience in vibration data collection and analysis. You will be asked to nominate an independent person who can verify that you have that experience.

➤ **WHAT ARE THE EXPERIENCE REQUIREMENTS FOR VCAT III?**

You must have 36 months of experience in vibration data collection and analysis. You will be asked to nominate an independent person who can verify that you have that experience. Certification to VCAT III also requires previous certification to VCAT II by a MIBoC approved certification body.

➤ **WHAT ARE THE EXPERIENCE REQUIREMENTS FOR VCAT IV?**

You must have 60 months of experience in vibration data collection and analysis. You will be asked to nominate an independent person who can verify that you have that experience. Certification to VCAT IV also requires previous certification to VCAT III by a MIBoC approved certification body.