



# NEW COURSES 2026

**SPECIALISATION COURSES WITH TSI  
ACCREDITATION CERTIFICATE.**



+34 913 45 97 30  
[www.tsisl.en/training](http://www.tsisl.en/training)



[infotsi@tsisl.es](mailto:infotsi@tsisl.es)





TRAINING 2026

# CAT I

(ISO 18436-2)  
(32 HOURS)

## CERTIFIED COURSE

IN CATEGORY I OF VIBRATION ANALYST.

1st call: 4th to 8th May.

2nd call: 19th to 23rd September..

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm  
to 6:00pm / Friday: 9:00am to 12:30pm - EXAM.

#### ● PRICES

Course: 1,145€ + Exam: €400 (VAT not included)

#### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- Certified Training: The Category I Vibration Analyst Course is a certified training programme endorsed by the Vibration Institute, a North American organisation with over 45 years of experience in the field of mechanical vibrations.
- Training Team: Composed of specialised TSI personnel with more than 35 years of experience and backed by more than 2,500 diagnostic and troubleshooting studies.
- Continuing Education: Participation in this course gives you 'permanent access' to a 'team of TSI specialists' who will answer your questions about equipment handling and diagnostics.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L



CERTIFICATION ISSUED BY:



### CONTENT

1. Sources of vibrations and their use.
2. Basic theory of vibrations.
3. Basic principles of data acquisition.
4. Main characteristics of machines.
5. Data acquisition equipment.
6. Data processing.
7. Vibration testing.
8. Fault diagnosis.
9. Machine condition assessment.
10. Corrective actions and acceptance tests.
11. ISO 10816 standards.
12. Case studies.
13. Related measurement reports and documentation.
14. Summary and conclusions.

#### PRACTICAL DEVELOPMENT

To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases.  
A certificate of attendance will be issued.

CUSTOMER SATISFACTION INDEX  
8.68 /10 PASS RATE: 88.91%

### CONTACT WITH US

+34 913 45 97 30 |  [www.tsisl.es](http://www.tsisl.es)

AVDA. PÍO XII, 44 - EDIFICIO PYOMAR TORRE 2 - BAJO IZDA.  
28016 MADRID - [TSI@TSISL.ES](mailto:TSI@TSISL.ES)

Maximum number of attendees: 15 people.

### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnosis through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of the course. The amount paid will be refunded minus 15% for administrative costs, plus the cost of the examination.

For CUSTOMISED COURSES please contact TSI.



TRAINING 2026

# CAT II

(ISO 18436-2)  
(38 HOURS)

## CERTIFIED COURSE

IN CATEGORY II OF VIBRATION ANALYST.

1st call: 25th to 29th May.

2nd call: 26th to 30th October.

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm  
to 6:00pm / Friday: 9:00am to 12:30pm - EXAM.

#### ● PRICES

Course: 1.395€ + Exam: €450 (VAT not included)

#### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

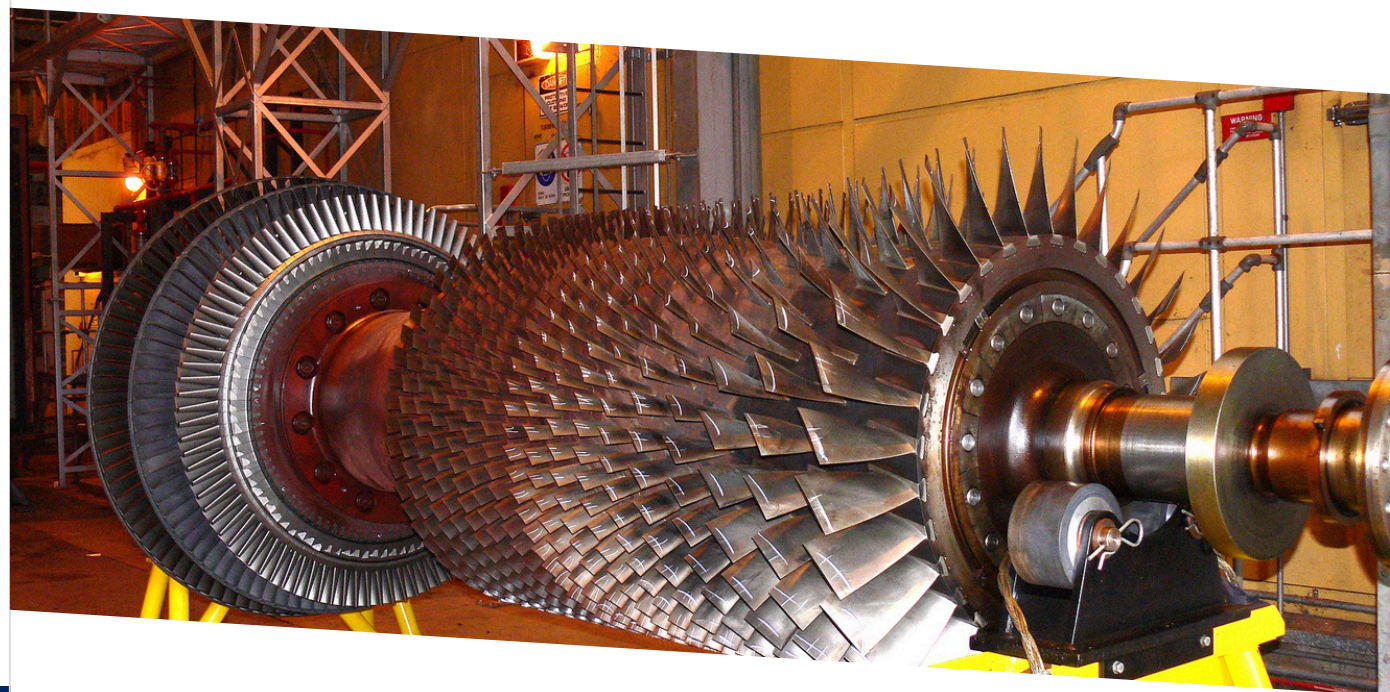
Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- Certified Training: The Category I Vibration Analyst Course is a certified training programme endorsed by the Vibration Institute, a North American organisation with over 45 years of experience in the field of mechanical vibrations.
- Training Team: Composed of specialised TSI personnel with more than 35 years of experience and backed by more than 2,500 diagnostic and troubleshooting studies.
- Continuing Education: Participation in this course gives you 'permanent access' to a 'team of TSI specialists' who will answer your questions about equipment handling and diagnostics.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L



CERTIFICATION ISSUED BY:



### CONTENT

1. Basic vibration theory.
2. Data acquisition.
3. Data processing.
4. Advanced fault diagnosis.
5. Machine condition assessment.
6. Machine testing.
7. Periodic monitoring.
8. Basic balancing in rotating machinery.
9. Summary and conclusions.

#### PRACTICAL DEVELOPMENT

To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases.  
A certificate of attendance will be issued.

CUSTOMER SATISFACTION INDEX

9.10 /10 PASS RATE: 88.55%

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Maximum number of attendees: 15 people.

### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnosis through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of the course. The amount paid will be refunded minus 15% for administrative costs, plus the cost of the examination.

For CUSTOMISED COURSES please contact TSI.



TRAINING 2026

# CAT III

(ISO 18436-2)  
(38 HOURS)

## CERTIFIED COURSE

IN CATEGORY III OF VIBRATION ANALYST.

**1st call: 1st to 5th June.**  
**2nd call: 16th to 20th November.**

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm  
to 6:00pm / Friday: 9:00am to 12:30pm - EXAM.

#### ● PRICES

Course: 1.645€ + Exam: 500€ (VAT not included)

#### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.  
Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- Certified Training: The Category I Vibration Analyst Course is a certified training programme endorsed by the Vibration Institute, a North American organisation with over 45 years of experience in the field of mechanical vibrations.
- Training Team: Composed of specialised TSI personnel with more than 35 years of experience and backed by more than 2,500 diagnostic and troubleshooting studies.
- Continuing Education: Participation in this course gives you 'permanent access' to a 'team of TSI specialists' who will answer your questions about equipment handling and diagnostics.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L



CERTIFICATION ISSUED BY:



### CONTENT

- 1.Theory and general principles.
- 2.Data acquisition.
- 3.Use and limitations of instrumentation.
- 4.Time and frequency domain analysis.
- 5.Orbit and phase analysis.
- 6.Resonance and critical speed tests.
- 7.Machinery condition analysis.
- 8.Vibration control.
- 9.Balancing.
- 10.Fault diagnosis.
- 11.Summary and conclusions.

#### PRACTICAL DEVELOPMENT

To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases.  
A certificate of attendance will be issued.

CUSTOMER SATISFACTION INDEX

**9.01 /10** PASS RATE: **80%**

### CONTACT WITH US

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28016 MADRID - TSI@TSISL.ES

Maximum number of attendees: 15 people.

### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnosis through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

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**For CUSTOMISED COURSES please contact TSI.**



# CBM

(21 HOURS)

## CONDITION-BASED MAINTENANCE COURSE FOR VESSELS.

**1st call: 4th to 6th March.**  
**2nd call: 2nd to 4th September.**

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm  
to 6:00pm / Friday: 9:00 am to 2:00 pm.

#### ● PRICES

Course: 990€ + VAT (Includes documentation, lunch and coffee during breaks)

#### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- **Solidity and experience:** Course derived from the MPA, taught continuously since 1983, with the participation of more than 1,500 companies.
- **Training approach:** Training independent of commercial brands, focused on technical qualification and practical troubleshooting.
- **Teaching team:** TSI trainers with over 35 years of experience and backed by more than 2,000 real diagnostic studies.
- **Continuous training:** subsequent access to a team of TSI specialists for technical support and professional consultations.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L

*'Take advantage of the opportunity to learn from real-life cases and receive a preliminary diagnosis at the end of the course.'*

Maximum number of attendees: 15  
A 15% discount will be applied for more than two attendees per company. Priority booking for TSI clients.

### CONTENT

1. Introduction: course objectives and scope.
2. Cultural change: the importance of vibrations, noise and acoustic signature in current designs. Impact on structural integrity, comfort, maintenance, operation and regulatory compliance.
3. Standards, directives and regulations: vibrations on ships: ISO-6954 (2000), class notations; noise on board: IMO code 337(91), class notations; external noise; acoustic signature: ICES CRR No. 209 and URN class notations.
4. Basic concepts of vibrations in ships and equipment: the importance of controlling them in the early stages of the project.
5. Vibrations in the ship's hull: global and local.
6. Sources of vibration, noise and acoustic signature in ships. Controlling them.
7. What to do and when: To reduce vibrations and noise and comply with the shipowner's specifications.
8. Brief review of CBM. Condition-based maintenance. Tool for reducing operating costs.
9. Identification of vibration and noise problems.
10. Noise in ships. Its control in the initial phases of the project.
11. Real cases.
12. Summary and conclusions of the course.

(\*) Note: The resolution of practical cases provided by attendees requires the provision of measurements (spectra) and tests performed. TSI undertakes to address each and every case that is submitted in writing.

## CUSTOMER SATISFACTION INDEX

8.80 /10

### CONTACT WITH US

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### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnosis through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of the course. The amount paid will be refunded minus 15% for administrative costs, plus the cost of the examination.

**PRACTICAL DEVELOPMENT:** To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases. A certificate of attendance will be issued.

**For CUSTOMISED COURSES please contact TSI.**



# COURSE (24 HOURS)

## VIBRATIONS, NOISE AND ACOUSTIC SIGNATURE IN SHIPS

**1st call: 10th to 12th March.**

**2nd call: 29th, 30th to 1st October.**

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm to 6:00pm / Friday: 9:00 am to 2:00 pm.

#### ● PRICES

Course: 1,200€ + VAT (Includes documentation, lunch, and coffee during breaks)

#### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- **Solidity and experience:** Course derived from the MPA, taught continuously since 1983, with the participation of more than 1,500 companies.
- **Training approach:** Training independent of commercial brands, focused on technical qualification and practical troubleshooting.
- **Teaching team:** TSI trainers with over 35 years of experience and backed by more than 2,000 real diagnostic studies.
- **Continuous training:** subsequent access to a team of TSI specialists for technical support and professional consultations.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L

*'Take advantage of the opportunity to learn from real-life cases and receive a preliminary diagnosis at the end of the course.'*

Maximum number of attendees: 15  
A 15% discount will be applied for more than two attendees per company. Priority booking for TSI clients.

### CONTENT

1. Introduction: course objectives and scope.
2. Cultural change: the importance of vibrations, noise and acoustic signature in current designs: integrity, comfort, maintenance and operation, environmental impact and new directives. The contractual framework: specifications and their correct definition.
3. Standards, directives and regulations: vibrations on ships: ISO-6954 (2000), class notations; noise on board: IMO code 337(91), class notations; external noise; acoustic signature: ICES CRR No. 209 and URN class notations.
4. Basic concepts of vibrations in ships and equipment: the importance of controlling them in the initial phases of the project.
5. Vibrations in the ship's hull: global and local.
6. Sources of vibration, noise and acoustic signature in ships. Controlling them.
7. What to do and when: to reduce vibrations and noise and comply with the shipowner's specifications.
8. Brief review of CBM. Condition-based maintenance. Tool for reducing operating costs.
9. Identification of vibration and noise problems.
10. Noise in ships. Its control in the initial phases of the project.
11. Real cases.
12. Summary and conclusions of the course.

(\*) Note: The resolution of practical cases provided by attendees requires the provision of measurements (spectra) and tests performed. TSI undertakes to address each and every case that is submitted in writing.

## CUSTOMER SATISFACTION INDEX

**8.80 /10**

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28016 MADRID - TSI@TSISL.ES

### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnosis through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of the course. The amount paid will be refunded minus 15% for administrative costs, plus the cost of the examination.

**PRACTICAL DEVELOPMENT:** To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases. A certificate of attendance will be issued.

**For CUSTOMISED COURSES please contact TSI.**



# COURSE (24 HOURS)

## VIBRATIONS IN DIESEL ENGINES AND GAS TURBINES.

**1st call: March 24 to 26.**

**2nd call: September 15 to 17.**

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm to 6:00pm / Friday: 9:00 am to 2:00 pm.

#### ● PRICES

Course: 1,100€ + VAT (Includes documentation, lunch, and coffee during breaks)

#### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- **Solidity and experience:** Course derived from the MPA, taught continuously since 1983, with the participation of more than 1,500 companies.
- **Training approach:** Training independent of commercial brands, focused on technical qualification and practical troubleshooting.
- **Teaching team:** TSI trainers with over 35 years of experience and backed by more than 2,000 real diagnostic studies.
- **Continuous training:** subsequent access to a team of TSI specialists for technical support and professional consultations.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L

*'Take advantage of the opportunity to learn from real-life cases and receive a preliminary diagnosis at the end of the course.'*

Maximum number of attendees: 15  
A 15% discount will be applied for more than two attendees per company. Priority booking for TSI clients.

### CONTENT

- 1.Introduction. Course objectives and scope.
- 2.Theoretical review. Basic concepts of vibrations.
- 3.Gas turbines: their dynamic characteristics.
4. Specific tests on gas turbines: critical speeds and dynamic balancing.
- 5.Most common vibration problems in gas turbines.
- 6.Gas turbine monitoring instrumentation. Continuous monitoring and maintenance.
- 7.Regulations applicable to gas turbines.
- 8.Diesel engines: single-stroke and two-stroke. Vibration characteristics.
- 9.Specific tests on diesel engines. Vibration analysis and regulations.
- 10.Monitoring of turbochargers and engines.
- 11.Regulations applicable to diesel engines and generator sets.
- 12.Combustion monitoring.
- 13.Real-life case studies\*.
- 14.Summary and conclusions of the course.

(\*) Note: The resolution of practical cases provided by attendees requires the provision of measurements (spectra) and tests performed. TSI undertakes to address each and every case that is submitted in writing.

### CUSTOMER SATISFACTION INDEX

**8.99 /10**

### CONTACT WITH US

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28016 MADRID - TSI@TSISL.ES

### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnosis through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of the course. The amount paid will be refunded minus 15% for administrative costs, plus the cost of the examination.

**PRACTICAL DEVELOPMENT:** To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases. A certificate of attendance will be issued.

**For CUSTOMISED COURSES please contact TSI.**



# PdM & CBM (24 HOURS)

## PREDICTIVE AND CONDITION-BASED MAINTENANCE FOR WIND TURBINES COURSE.

**1st call: February 24 to 26.**

**2nd call: September 8 to 10.**

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm to 6:00pm / Friday: 9:00 am to 2:00 pm.

#### ● PRICES

Course: 1,050€ + VAT (Includes documentation, lunch, and coffee during breaks)

#### ● SITE

TSI offices  
Direction: Publio Beltrán Palomo.  
Trainers: engineers specialising in noise and vibrations.

### OUR KEYS TO SUCCESS

- **Solidity and experience:** Course derived from the MPA, taught continuously since 1983, with the participation of more than 1,500 companies.
- **Training approach:** Training independent of commercial brands, focused on technical qualification and practical troubleshooting.
- **Teaching team:** TSI trainers with over 35 years of experience and backed by more than 2,000 real diagnostic studies.
- **Continuous training:** subsequent access to a team of TSI specialists for technical support and professional consultations.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L

*'Take advantage of the opportunity to learn from real-life cases and receive a preliminary diagnosis at the end of the course.'*

Maximum number of attendees: 15  
A 15% discount will be applied for more than two attendees per company. Priority booking for TSI clients.

### CONTENT

- 1.Introduction.
- 2.Tools for optimizing wind farm operation.
- 3.Predictive maintenance of faults (MPA) in wind turbines.
- 4.Basic concepts of vibrations and complementary techniques.
- 5.Stages of predictive maintenance of faults (MPA) and its development.
- 6.Regulations.
- 7.Typical faults in wind turbines: their identification.
- 8.Implementation of MPA adapted to wind farms.
- 9.Real cases\*
- 10.Characterization of wind farms: determination of actual loads on mechanical components.
- 11.Continuous protection and monitoring. Applications to offshore wind energy.
- 12.Summary and conclusions of the course.



(\*) Note: The resolution of practical cases provided by attendees requires the provision of measurements (spectra) and tests performed. TSI undertakes to address each and every case that is submitted in writing.

## CUSTOMER SATISFACTION INDEX

**8.99 /10**

### CONTACT WITH US

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### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive maintenance departments. With basic knowledge of machinery condition verification through vibration analysis and basic knowledge of the measurement chain, processing, signals, among others.

No experience in machinery diagnostics through vibration analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation will be confirmed once the fee has been paid in advance by bank transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of the course. The amount paid will be refunded minus 15% for administrative costs, plus the cost of the examination.

**PRACTICAL DEVELOPMENT:** To complement the theoretical presentation, attendees will participate in working groups to resolve practical cases. A certificate of attendance will be issued.

**For CUSTOMISED COURSES please contact TSI.**



# PdM Course (24 HOURS)

## PREDICTIVE MAINTENANCE (PDM)

### Industrial Sector

**1st call: April 7 to 9.**

**2nd call: October 6 to 8.**

#### MAIN FEATURES

##### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm to 6:00pm / Friday: 9:00 am to 2:00 pm.

##### ● PRICES

Course: 1,100€ + VAT (Includes documentation, lunch, and coffee during breaks)

##### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

Trainers: engineers specialising in noise and vibrations.

#### OUR KEYS TO SUCCESS

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TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L

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Maximum number of attendees: 15  
A 15% discount will be applied for more than two attendees per company. Priority booking for TSI clients.

#### CONTENT

- 1.Introduction: course objectives and scope.
- 2.Predictive maintenance of breakdowns (MPA). Stages.
- 3.Basic concepts of vibrations. Physics of vibration.
- 4.Measurement in MPA.
- 5.Spectrum analysis in MPA.
- 6.Diagnosis in MPA. Diagnosis of the most common faults: imbalance, misalignment, backlash, resonance, bearings, gears, electrical defects.
- 7.Correction in PFM: dynamic balancing of rotating equipment.
- 8.Standards on vibrations in rotating machines. Their correct application.
- 9.Implementation of a PFM system.
- 10.Introduction to continuous monitoring of rotating equipment.
- 11.Real-life case studies\*.
- 12.Summary and conclusions of the course.

(\*) Note: The resolution of practical cases provided by attendees requires the provision of measurements (spectra) and tests performed. TSI undertakes to address each and every case that is submitted in writing.

## CUSTOMER SATISFACTION INDEX

**8.73 /10**

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# FAILURE ANALYSIS

## AND ROOT CAUSE INVESTIGATION – CASE STUDIES.

(24 HOURS)

1st call: April 7 to 9.

2nd call: October 6 to 8.

### MAIN FEATURES

#### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm – 3:00pm  
to 6:00pm / Friday: 9:00 am to 2:00 pm.

#### ● PRICES

Course: 1,100€ + VAT (Includes documentation, lunch, and  
coffee during breaks)

#### ● SITE

TSI offices

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at the end of the course.'*

Maximum number of attendees: 15  
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attendees per company. Priority booking for TSI clients.

### CONTENT

- 1.Introduction.
- 2.Setup: review of basic vibration concepts.
- 3.The methodology of fault consulting. Root cause analysis.  
What is it and how is it applied?
- 4.Experimental fault diagnosis techniques. When and how to  
apply them? How to overcome the limitations of my  
equipment?
- 5.Correction methods I: dynamic balancing: regulations, in-situ  
and bench balancing. Balancing in one and two planes: the  
technique. Practical cases.
- 6.Correction methods II: "reinforcing my structure." When and  
how? Knowledge of analytical techniques for optimization.  
Real cases.
- 7.Correction methods iii: vibration isolation in machines and  
equipment.
- 8.Real-life case studies. Identification of faults in: bearings,  
fans, resonances, feed water pumps, centrifugal  
compressors, gearboxes, electric motors, gas turbines,  
hydraulic pumps, large structures, turbogenerator sets, wind  
turbines, etc.
- 9.Troubleshooting provided by attendees\*.
- 10.Summary and conclusions.

(\*) Note: The resolution of practical cases provided by attendees requires  
the provision of measurements (spectra) and tests performed. TSI  
undertakes to address each and every case that is submitted in writing.

## CUSTOMER SATISFACTION INDEX

8.59 /10

### CONTACT WITH US

+34 913 45 97 30 | [www.tsisl.es](http://www.tsisl.es)

AVDA. PÍO XII, 44 – EDIFICIO PYOMAR TORRE 2 – BAJO IZDA.  
28016 MADRID – TSI@TSISL.ES

### ADDITIONAL INFORMATION

THIS TRAINING IS ONLY AVAILABLE IN PERSON

#### WHO IS IT AIMED AT?

Technicians and managers of reliability and/or predictive  
maintenance departments. With basic knowledge of machinery  
condition verification through vibration analysis and basic  
knowledge of the measurement chain, processing, signals,  
among others.

No experience in machinery diagnostics through vibration  
analysis is required.

#### FORMALISATION OF ENROLMENT

Reservations can be made by telephone or email. The reservation  
will be confirmed once the fee has been paid in advance by bank  
transfer.

#### CANCELLATION POLICY

Cancellation is possible up to 20 working days before the start of  
the course. The amount paid will be refunded minus 15% for  
administrative costs, plus the cost of the examination.

PRACTICAL DEVELOPMENT: To complement the theoretical  
presentation, attendees will participate in working groups to  
resolve practical cases. A certificate of attendance will be issued.

For CUSTOMISED COURSES please contact TSI.



# PUMP FAILURE

DIAGNOSIS AND CONDITION MONITORING.

(21 HOURS)

**1st call: April 22 to 24.**

**2nd call: September 23 to 25.**

## MAIN FEATURES

### ● SCHEDULE

Monday to Thursday: 9:00am to 2:00pm - 3:00pm  
to 6:00pm / Friday: 9:00 am to 2:00 pm.

### ● PRICES

Course: 900€ + VAT (Includes documentation, lunch, and coffee during breaks)

### ● SITE

TSI offices

Direction: Publio Beltrán Palomo.

Trainers: engineers specialising in noise and vibrations.

## OUR KEYS TO SUCCESS

- **Solidity and experience:** Course derived from the MPA, taught continuously since 1983, with the participation of more than 1,500 companies.
- **Training approach:** Training independent of commercial brands, focused on technical qualification and practical troubleshooting.
- **Teaching team:** TSI trainers with over 35 years of experience and backed by more than 2,000 real diagnostic studies.
- **Continuous training:** subsequent access to a team of TSI specialists for technical support and professional consultations.



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L

*'Take advantage of the opportunity to learn from real-life cases and receive a preliminary diagnosis at the end of the course.'*

Maximum number of attendees: 15  
A 15% discount will be applied for more than two attendees per company. Priority booking for TSI clients.

## CONTENT

- 1.Introduction | Basic principles.
- 2.Main components.
- 3.Classification of pump types.
- 4.Main failure modes.
- 5.Applicable regulations.
- 6.Tools for optimization.
- 7.Dynamic tests: variable speed, modal analysis, torsional analysis, and reinforcement studies.
- 8.Real-life case studies. Identification and correction of complex failures.
- 9.Summary and conclusions.



(\*) Note: The resolution of practical cases provided by attendees requires the provision of measurements (spectra) and tests performed. TSI undertakes to address each and every case that is submitted in writing.

CUSTOMER SATISFACTION INDEX

8.84 /10

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