



Noise & Vibration



Measurement and Analysis Solutions

for Energy & Process

Power Generation

Oil & Gas

Chemical

Petrochemical



Made for Your Demanding World

1- Improve Efficiency

2- Maximize Uptime

3- Minimize Costs

Test Cells

- > Prototype validation
- > Overhaul and acceptance at OEM



Improve acceptance testing efficiency

- > Integrated & automated test process and report generation
- > User friendly operation
- > Multi-channel real-time processing and monitoring
- > Universal and multiple sensors' types: proximity, velocity, acceleration, temperature, strain, pressure, etc

Field Testing

- > On-site commissioning
- > Machinery startup
- > Installation vibration signatures
- > Diagnostics and troubleshooting



Travel light for reliable tests

- > Versatile toolbox for all noise and vibration diagnostic applications
- > Portable and rugged analyzers for the field measurements
- > Multi-channel simultaneous acquisition for run-up and coast downs
- > Real-time analysis for field efficiency
- > Full signal recording for office processing and archiving

Remote Monitoring

- > After installation follow-up
- > Random & unrepeatable phenomena



Optimize costs and predict failure

- > Alarm triggering warning via email or the Internet
- > Collect raw signal information for thorough office processing



They trust OROS

- > "From rotating analysis to structural dynamic analysis: with my OROS system, I am ready for everything when I go out in the field."

Greg PARKER, 39
Noise and Vibration technician,
Installation & Maintenance division.

Instruments, Software, Services



Rotating Analysis



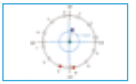
ORBIGate

The test solution for turbomachinery, bringing to your finger tips, orbits, shaft centerlines, Bode and trends plots in a dedicated user friendly environment.



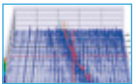
FFT Diag

An extension of the standard FFT, features advanced techniques such as cepstrum, envelope analysis and correlation.



Balancing

Single and dual plane balancing capabilities provide fast, accurate and easy to understand balancing solutions.



Synchronous Order Analysis

Allows to go one step further in order analysis carrying advanced SOA and complex orders extraction.

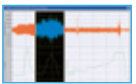


Torsion

Using the compact and integrated frequency to voltage converter, monitor rotational speed fluctuation and torsional resonances.



Data Acquisition



Recorder

Record time domain data and post process them later (ASAM ODS compatible).



Time Domain Analysis

Analyze the signal in the time domain to get a set of statistical results (DC, RMS, Pk-Pk, etc...)

Made for the Field, Flexible, Accurate



- > From 2 to hundreds of channels
- > Portable and rugged
- > Real-time and multi-analysis

PC Free Operations



- > Remote Monitoring
- > Autonomous Monitoring
- > Continuous recording

Plug and Play Signal Conditioning



- > Strain gauges (Xpod)
- > Temperature (Xpod)

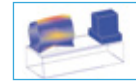


Structural Dynamics



FFT

Allows to carry general vibration tests: in particular cross spectra and frequency response functions for coupling and damping applications.



ODS (Operating Deflection Shape)

The test solution allowing to show the deflection of the machine and its environment during operation: bearing housing, foundations, skids and pipings.



Modal Analysis

The test solution adapted for the determination of the structural mechanical properties of components such as blades, resonance frequencies, damping and mode shapes.

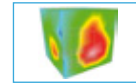


Noise Analysis



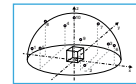
1/3rd Octave

Process and display 1/n octave band spectra as well as overall values for acoustic signature and investigation.



Sound Intensity

A flexible module based on sound intensity acquisition: allows to determine ISO 9614 based sound power as well sound color map.



Sound Power

A dedicated module for assisting semi free field sound power tests: based on sound pressure level acquisition.

Anywhere Close to You

- > Trainings
- > Customization & Integration
- > Expertise & Assistance
- > Premium Contracts
- > Hotline
- > Worldwide Accredited Maintenance Centers



Measuring your Rotating Machinery

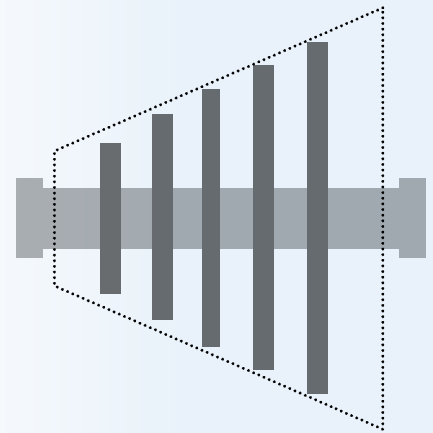


Rotating Analysis



Fluid Film Bearings

Relative shaft vibration is captured with proximity probes. Analyzing this data requires a number of software tools such as **orbit and shaft centerline** analysis. ORBIGate, the OROS **turbomachinery vibration** solution, features these analysis and many more analysis tools. These tools display the physical motion of the shaft and let you detect faults such as oil whirl & whip, preload, misalignment, rub and others.



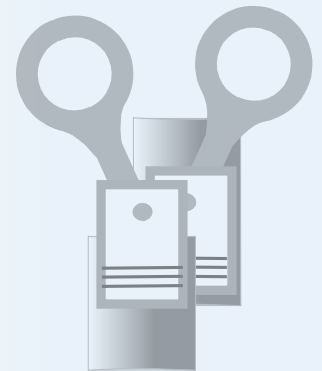
Roller Bearings

Damaged roller bearings are common. Their vibration signatures are usually measured with an accelerometer mounted on bearing housing. The **FFT-Diagnostics module** uses **envelope demodulation** to analyze these vibration sources to determine if the source is from the roller elements or the races.



Gear Analysis

Gear boxes have a complex vibration signature, usually occurring at high frequencies. The **FFT-Diagnostics tool**, such as **cepstrum, kurtosis** and **harmonic markers** are necessary to describe and understand the generated vibrations. The virtual tachometers management feature allows the analyst to determine the speed and phase information based on the gear ratio.



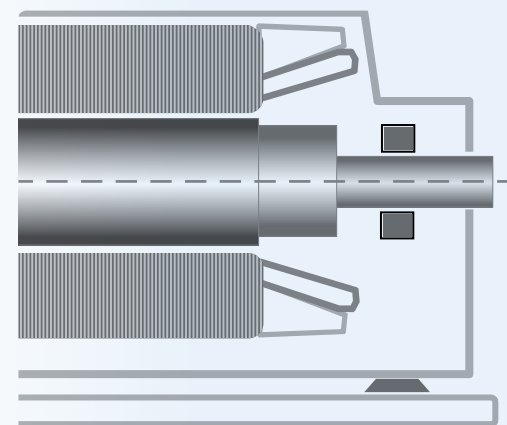
Torsional Analysis

Torsional vibration and torque fluctuation are usual phenomena especially on large internal combustion engines. The OROS 3-Series **torsional software module** utilizes a **frequency to voltage converter** for speed input providing the following information. The angular velocity profile displays RPM variations. Two pulse train combination detects torsional resonances.



Balancing

Unbalance, is the most common source of vibration on rotating machinery. It is easy to detect and with the OROS **Balancing software module**, the operation is fast and accurate. The tool displays the balancing data for **up to two planes** and assists you during the measurement, trial and correction process. The OROS Balancing tools are ideal for **shop** and **field** balancing.



They trust OROS

> "When starting a vibe test out in the field, I am just a couple of minutes away from my orbit and gap analysis, simply and efficiently."

Matthew MOWL, 34
Rotating Machinery Specialist,
Plant Asset Management.



Turbines and Compressors

- > Gas and Steam Turbines
- > Compressors
- > Pumps
- > Hydro Turbines
- > Wind Mills
- > Fans and Blowers

Reciprocating Machinery

- > Internal Combustion Engines: Diesel and Gas
- > Reciprocating Compressors

Electric Machines

- > Electric Motors
- > Power Generators

Structural Dynamics



ODS (Operating Deflection Shape)

Operating deflection shape is an important analysis procedure used to **locate machinery and piping system deflection** during operation. It is based upon simplified geometry description of the machine train. After measuring the vibration response at multiple locations, the mechanical source can be identified. The **ODS software module** helps to determine vibration sources, a transmission point and eventually a mechanical modification to be implemented.



End Winding Bump Testing

Generators and motors end windings are strongly excited by frequencies at twice the network frequency: any mode nearby that frequency will create high vibration response. **FFT analyzers** and the **OROS Modal 2 solution** are well adapted for bump tests acquisition, resonance frequency determination and deflection shapes.



Blade Modal Testing

When blade dynamic structural characteristics should be determined, they are submitted to modal testing: based on impact hammer testing or shaker excitation. Based on **multichannel analyzers**, vibration response can be captured by accelerometers or strain gauges. **OROS Modal 2** can process the FRFs to give the modal characteristics.



Damping & Isolation

Dynamic coupling between machine trains and their **skids or foundations** can be a problem during the machine installation and the field acceptance test. Excitation frequencies should not match the response frequency of the hosting structure: the mounting choice is key. To tackle this issue, OROS products like **transfer functions, ODS, and damping calculations** assist the user in start procedures.

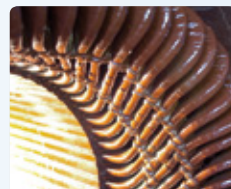


Noise Analysis



Octave & Sound Intensity

Ambient noise is often a potential hearing and environmental issue. The ambient noise generated from rotating machinery can be evaluated using general tools such as the **1/3 octave analysis**. But more thorough measurements can be achieved using the **sound power** value. The **sound intensity** technique is often completed in the field thanks to its portability and adaptability.



Ordering Information



OROS is a global manufacturer and solution provider of noise and vibration measurement systems.

OROS masters the latest technology of data acquisition, digital signal processing as well as user interface software.

OROS instruments are used in the major sectors of industry and research, for industrial acoustics, structural dynamics and rotating machinery applications. Hardware and software are totally designed in-house.

Now approaching 30-years in business, OROS instruments are renowned as being designed for the field but powerful enough for any lab.



Find out more on the OROS offer in the Range brochure.

Downloadable on www.oros.com

Software Modules

Rotating Analysis

ORNVS-ORBI	ORBIGate, the dedicated Turbomachinery Vibration Solution
ORNVS-SOA	Synchronous Order Analysis plug-in
ORNVS-FFTDiag	Real-time diagnostic tool set (Envelope, Cepstrum, Pk; Pk-Pk, Crest factor, shaft view) add-on
ORNVS-IVC	Integrated Instantaneous angular Velocity Converter plug-in, allows on-line and offline torsional analysis
ORNVS-BAL3	Balancing Solution

Structural Dynamics

ORNVS-FFT	Real-time FFT plug-in
ORNVS-MOD300	ODS (Operating Deflection Shape) Solution
ORNVS-MOD350	ODS (Operating Deflection Shape) and Modal Analysis Solution

Data Acquisition

ORNVS-REC	Recorder
ORNVS-TDA	Real-time time domain analysis plug-in
ORNVS-SYSTE0	Remote / stand-alone solution for machinery monitoring

Noise Analysis

ORNVS-OCT	Real-time filter based 1/n octave plug-in
ORNVS-SI	Sound Intensity Solution
ORNVS-SP	Sound Power Solution

Instruments

Analyzers: examples of configurations

Above software options may be added to these configurations	
OR34-FREQ-4	OR34-4 Ch. FFT analyzer
OR35-FREQ-8	OR35-8 Ch. FFT analyzer
OR36-FREQ-16	OR36-16 Ch. FFT analyzer
ORMP-FREQ-16	Mobi-Pack-16 Ch. FFT analyzer
OR38-FREQ-32	OR38-32 Ch. FFT analyzer

Inputs Conditioners

OR36/8 - PXD-B	8 Ch. Strain gauges bridge conditioner XPOD for OR36 & OR38
OR36/8 - PXD-T	8 Ch. PT100 and thermocouple conditioner XPOD for OR36 & OR38

Distributed Systems

ORVM-NG-300	300 Ch. Supervisor software license
ORSM-SAT	SmartRouter Satellite, Autonomous analyzer controller

Specifications

Channels count	2 to hundreds of channels
Inputs	
Sampling	2 kS/s to 102.4 kS/s - 24 bits delta sigma ADC
Accuracy	Phase $\pm 0.02^\circ$ - amplitude ± 0.02 dB - Dynamic > 120 dB
Conditioning	AC/DC/ICP/TEDS up to 40 V
Auxiliaries	
Outputs	DC to 40 kHz - ± 10 V range - 24 bits DACs - THD < 0.002%
Ext. synch (Trigger / Tach)	64 x over sampled - Resolution < 160 ns (0.06° @ 1 kHz) - up to 40 V
DC channels*	Sampling 10 Hz - 50 Hz/60 Hz rejection - reproducibility < 1 mV
System	
Hard disk	PC or Mobi-Disk
Internal battery	up to 1h30 min
Link to PC	100 Mbit/s Ethernet
Weight from	1.4 kg/3 lb to 10 kg/22 lb
* Optional features	



Edificio Antalia
Albasanz, 16
28037 MADRID
Tel. 91 567 97 00
Fax: 91 570 26 61

www.alavaingenieros.com

Torre Mapfre-Vila Olimpica
Marina, 16 - Planta 11-C2
08005 BARCELONA
Tel. 93 459 42 50
Fax: 93 459 42 62

alava@alava-ing.es

M002-099-3



OROS
23 chemin des pres
Inovallee 4403
F-38944 Meylan Cedex

Tel: +33.811.70.62.36
Fax: +33.476.90.51.37
Mail: info@oros.com
Web: www.oros.com

OROS China
Tel: +86.10.59892134
Fax: +86.10.59892135
Mail: info@oroschina.com
Web: www.oros.com

French Sales Office
Tel: +33.169.91.43.00
Fax: +33.169.91.29.40
Mail: info@orosfrance.fr
Web: www.orosfrance.fr

OROS GmbH
Tel: +49.261.133.96.50
Fax: +49.261.133.96.49
Mail: info@oros-deutschland.com
Web: www.oros-deutschland.com

OROS Inc.
Tel: +1.888.200.0ROS
Tel: +1.703.478.3204
Fax: +1.703.478.3205
Mail: info@orosinc.com
Web: www.orosinc.com

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