

Energy & Process

Vibration
Test & Measurement
Solutions

Maximize efficiency in

- Power Generation
- Oil & Gas
- Chemical
- Petrochemical

Product Line



Am OROS

Made For Your Demanding World

1-> Improve Efficiency 2-> Maximize Uptime 3-> Minimize Costs

Test Cells

- Prototype validation
- Overhaul and acceptance



Improve production testing efficiency

- Integrated & automated test process and report generation
- User friendly operation
- Multichannel real-time processing and monitoring
- Universal and multiple sensors' types: displacement, 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 diagnostics applications
- Portable and rugged analyzers for the field measurements
- Multichannel 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 prevent failure

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



"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** Vibration Diagnostics Engineer,
Installation & Maintenance Division

The Energy & Process Analyzer

Rotating Analysis



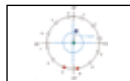
ORBIGate

The test solution for fluid film bearing machinery, bringing to your finger tips, orbits, shaft centerlines, Bode and trend diagrams in a user friendly environment.



FFT & FFT-Diag

A consistent tool-set for on-site and test benches for diagnostics of industrial machinery.



Balancing

Any machine (rotors, axles and shafts) can be balanced during a one or two plane process.



Synchronous Order Analysis

Go one step further for carrying advanced SOA.



Time Domain Analysis

Analyze the signal in the time domain giving a whole set of statistical results.



Torsion

Look at rotating speed fluctuations without any requirement for an additional frequency to voltage converter.



Noise & Vibration ANALYZERS

- From 2 to hundreds of channels
- Portable and rugged
- Multi-analysis



Recorder

Record time domain data and post-process them later.

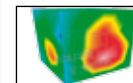
Structural Dynamic Analysis



ODS and Modal Analysis

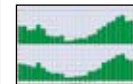
Powerful techniques for structures behaviors understanding, simulation results validation, mechanical designs and maintenance.

Noise Analysis



Sound Intensity

A flexible module to get a large number of information, such as sound power or noise source localization, on the sound pattern emitted.



Octave Analysis

1/n octave analysis for acoustic signature and investigation from a source.



Remote & Autonomous Vibration Monitoring

With the SmartRouter™, the analyzer becomes completely autonomous and remote controlled.

SysTeo, with its recording and analysis capabilities, is a dedicated tool for the temporary vibration monitoring of rotating machinery.

OROS products cover a wide range of applications for general purpose noise and vibrations testing and in particular for rotating, structural dynamic and acoustic analyses. Applications can even be further extended based on the customization features available with OROS analyzers which let you integrate the system in your test cells.

Discover our full product range on www.oros.com !

Vibration Analysis For Your Rotating Machinery

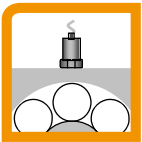


Rotating Analysis



Fluid Film Bearing

Relative shaft vibrations are usually captured with eddy current probes. Analyzing this data requires a number of software tools such as **orbit**, **shaft centerline** and **trend** displays. The range of ORBIGate features displays the physical motion of the shaft and let you detect defaults such as oil whirl & whip, unbalance, misalignment, rub and others.



Roller Bearing

Damaged roller bearings are common vibration sources. Their **vibration spectrum**, measured with an accelerometer mounted on the casing, allows you to determine mechanical failures on balls or races. **Envelope** demodulation, part of FFT-Diag module, is the key tool for that purpose.



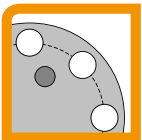
Gear Analysis

Gear boxes have a large and complex vibration signature, usually occurring at high frequencies. Due to shocks, spectra with a high harmonic content are generated: tools, such as **Cepstrum**, **Kurtosis** and **harmonic markers** are necessary to describe and understand the generated vibrations. Virtual tachometers management is a key feature, allows you to get the speed and phase information based on the gear ratio.



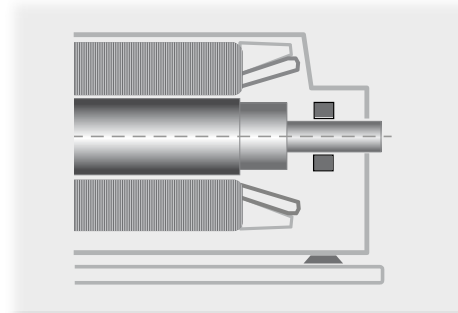
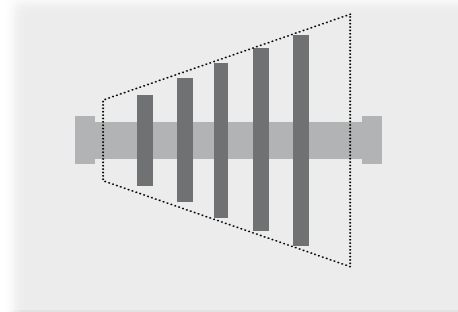
Torsional Analysis

Torsional vibration and torque fluctuation are usual phenomena especially on large diesel engines. For that purpose, having an **integrated frequency to voltage converter** in the analyzer lets you get a very compact packaging for the field. The angular velocity profile displays any RPM variations. Two pulse trains combination assist you to detect and locate torsional resonances.



Balancing

Unbalance, featuring a **high 1X component** is probably the most common source of high vibrations. It is easy to detect but may be a bit trickier to correct. The OROS Balancing, an easy and high performance software solution, is dedicated to that purpose. It displays the balancing constraints for each plane and assists you during the test and the correction process.



“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 & Steam Turbines
- Hydro Turbines
- Wind Mills
- Pumps
- Compressors & Expanders
- Fans & Blowers

Reciprocating Machinery

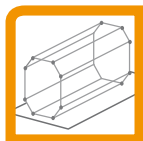
- Diesel Engines
- Reciprocating Compressors

Electric Machines

- Electric Motors
- Power Generators



Structural Dynamic Analysis



ODS (Operating Deflection Shape)

Looking at operating deflection shapes is an important step to **locate where the machinery vibrates the most** during the operation. It is based on a simplified geometry description of the machinery. Then, after measuring the vibration response at multiple locations and frequencies, the mechanical source can be identified. The ODS solution helps to determine a vibration source, a transmission point and eventually a mechanical modification to be implemented.



Bump Testing and Modal Analysis

Bump testing using an impact hammer is a typical measurement mode in the Energy and Process world. It is typically done on **blades** to determine their structural dynamic characteristics: in that case the process can be followed by a modal analysis. This measurement is often achieved on **generator end-windings** to determine their structural resonance frequencies.



Coupling & Transmission Analysis

Dynamic couplings between rotating machinery and their receiving **skids or foundations** is a typical problem to be faced during the machine installation and the field acceptance test. Excitation frequencies of the machinery should not match the resonance frequency of the hosting structure: the mounting choice is key. To tackle this issue, OROS products like **transfer functions, ODS and damping calculations** are required.



Noise Analysis



Octave & Sound Intensity

Noise is often an additional annoying issue on rotating machinery. Noise can be evaluated using general tools such as **1/3 octave analysis** but more thorough measurements can be achieved to get to the **sound power** value. On the field, the technique that is often used is the sound intensity method because of the portability and adaptability.





Worldwide Presence:

OROS products are marketed through our network of authorized representatives. Visit www.oros.com or contact info@oros.com to find your local reseller.

For over 20 years, OROS' designs and manufacturing have been renowned for providing the best in noise and vibration analyzers as well as in specific application solutions. OROS bears the mission of being a supplier of high-end instruments, empowering engineers and technicians to improve performance and efficiency over the development cycle at all stages of experimental testing.

Ordering Information

Rotating Analysis

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

Structural Dynamic Analysis

ORNV-MOD300	ODS (Operating Deflection Shape Solution)
ORNV-MOD350	ODS (Operating Deflection Shape) and Modal Analysis Solution

Noise Analysis

ORNV-SI	Sound Intensity Solution
ORNV-OCT	Real-time filter based 1/n octave plug-in
ORNV-SYSTE0	Remote / Stand Alone solution for monitoring
ORNV-REC	Recorder

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

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

www.oros.com
Noise & Vibration ANALYZERS

M002-099-1



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

Tel: +33 476 90 62 36
Fax: +33 476 90 51 37
Mail: info@oros.com
Web: www.oros.com

OROS France
Tel: +33 169 91 43 00
Tel: +33 476 90 53 26
Mail: info@orosfrance.fr
Web: www.orosfrance.fr

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

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