OROS

Noise & Vibration

Measurement and Analysis Solutions
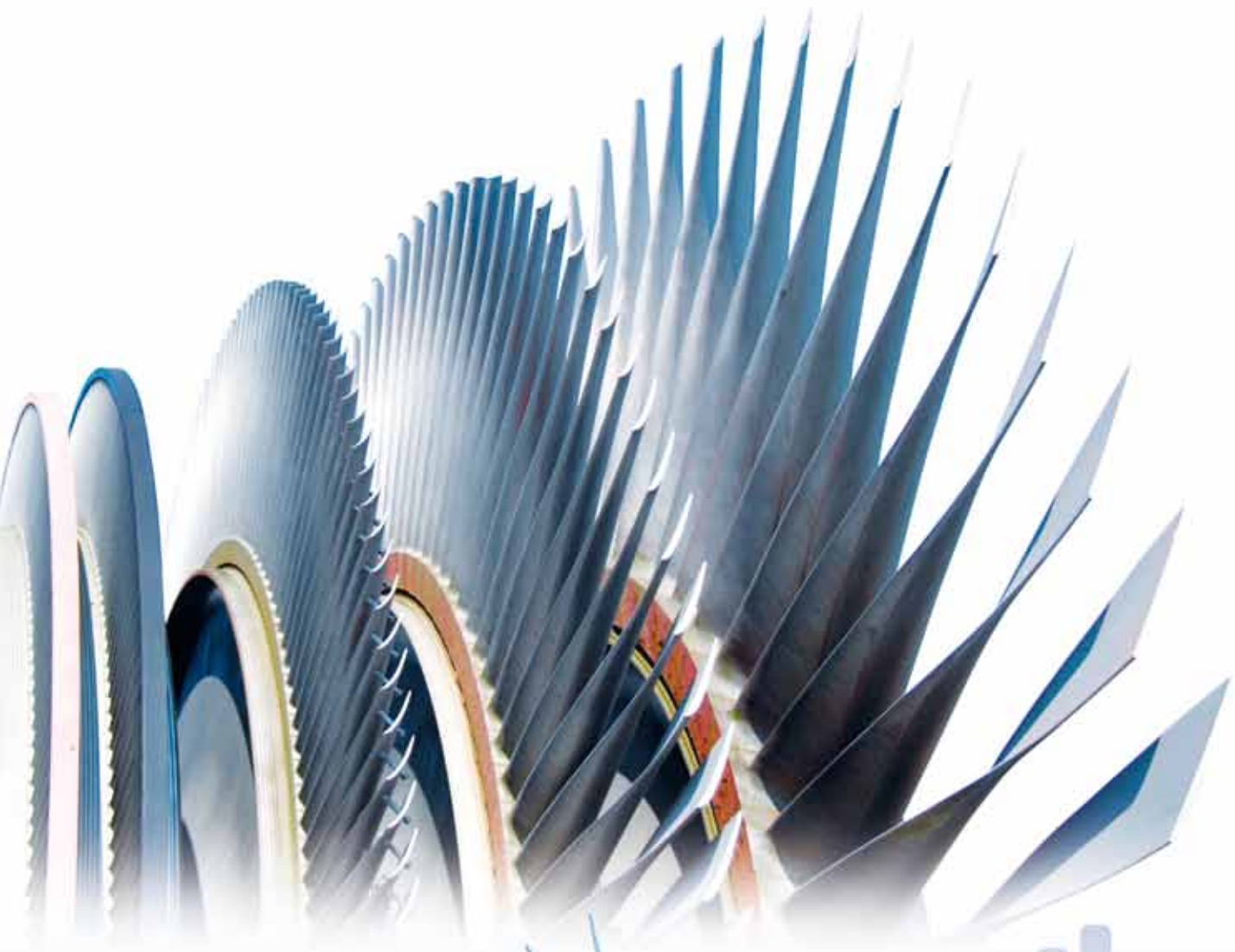
for Energy & Process

Power Generation | Oil & Gas | Chemical | Petrochemical

Made for Your Demanding World

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 trigerring 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.**

www.oros.com

OROS
Solutions

INSTRUMENTS Made for the Field, Flexible, Accurate

Multi-channel Analyzers

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

PC Free Operations

> Remote monitoring
> Autonomous monitoring
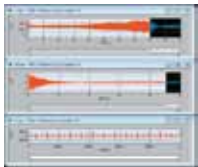> Stand alone recorder

Handling Any Transducers

> Plug and play signal conditioning
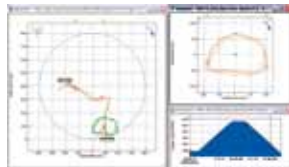 (strain gauges and temperature Xpods)

SOFTWARE R&D, Acceptance, Diagnostics
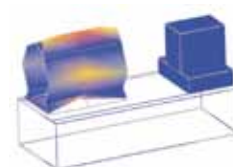
Data Acquisition
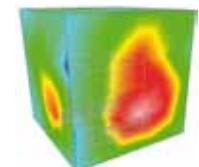
> Recorder
> Time Domain Analysis

Rotating Analysis

> ORBIGate turbomachinery
  vibration module
> Vibration diagnostic toolset
> Balancing
> Synchronous Order Analysis
> Torsion

Structural Dynamics

> FFT
> ODS (Operating Deflection Shape)
> Modal analysis

Noise Analysis

> 1/3rd octave
> Sound Intensity
> Sound Power

SERVICES Anywhere Close to You

Renting
> Instruments
> Software modules

Training
> Initial
> Advanced
> Webinar

Coaching
> Sofware customization
> Assistance in your measurement
> Expertise in diagnostics

A Dedicated Team
> Dynamic and responsive Customer Care department
> Hotline
> Global Accredited Maintenance Centers
  (worldwide coverage)

Maintenance and Contracts
> Premium contracts
> Software updates
> Hardware upgrades
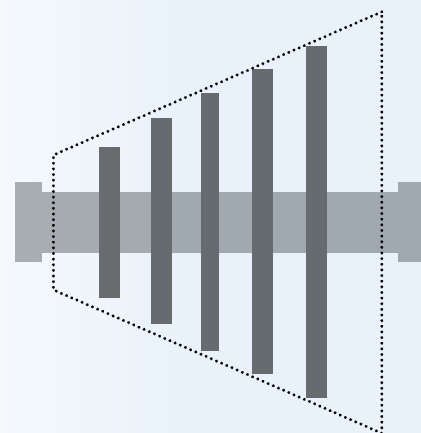> Calibration

Measuring your Rotating Machin

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.
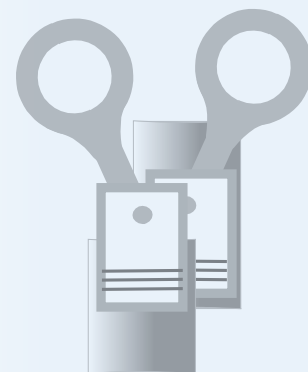
Torsional Analysis

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

Imbalance is probably the most common source of vibration on rotating machinery. Depending on the machine and the rotating speed range the rotor can be considered to be **rigid or flexible**. In the first case, the **Single Dual plane balancing** module will be used. In the second case a multiplane approach should be preferred and the associated **Multiplane module** should be used.
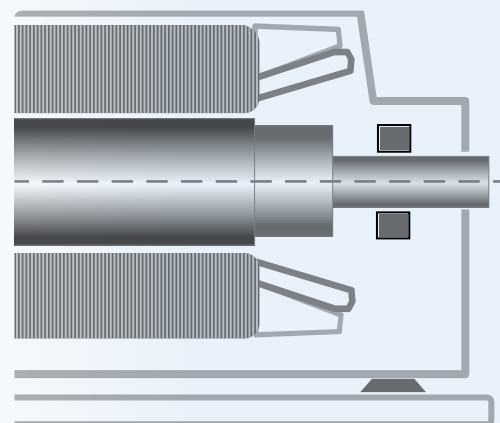
On-Site Measurements & Applied Trainings

Experts from OROS may come on-site for applied trainings. They will help you using your OROS system. They can provide assistance in your measurement. They are also able to recommend optimization in your measurement process depending on your application and field requirements.

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 **Modal, the OROS Structural Dynamics module,** 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. **Modal, the OROS Structural Dynamics module,** 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.

OROS
MEASURING NOISE & VIBRATION

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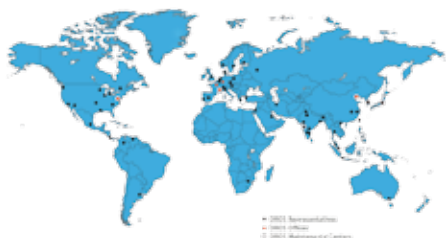
OROS is a global manufacturer and solution provider of noise and vibration measurement systems.

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
ORNV-SOA	Synchronous Order Analysis plug-in
ORNV-FFTDiag	Real-time diagnostic tool set (Envelope, Cepstrum, Pk; Pk-Pk, Crest factor, shaft view) add-on
ORNV-IVC	Integrated Instantaneous angular Velocity Converter plug-in, allows on-line and offline torsional analysis
ORNVS-BAL	Single Dual Plane Balancing module
ORNVS-BAL-MP	Multiplane Balancing module

Structural Dynamics

ORNV-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

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

Noise Analysis

ORNV-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 ±0.02° - 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

M002-099-4

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