

Noise & Vibration

Test and Measurement Solutions

for Marine Industries



Made for Your Demanding World

1- Improve Efficiency

2- Maximize Uptime

3- Minimize Costs

Test Cells

- > Prototype validation
- > Factory acceptance



Improve production testing efficiency

- > Integrated & automated test process and report generation
- > User friendly operation
- > Multichannel real-time processing and displays
- > Universal and multiple sensor's types: microphones, acceleration, temperature, strain, pressure...

On-board Testing

- > On-board acceptance
- > Maintenance operation
- > Diagnostics and troubleshooting

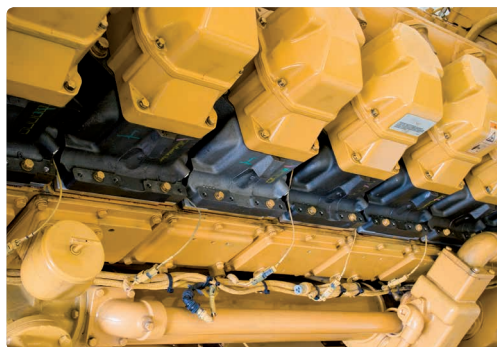


Travel light for reliable tests

- > Versatile toolbox for all noise and vibration diagnostics applications
- > Distributed acquisition systems over the ship
- > Portable and rugged analyzers for field measurements
- > Multichannel simultaneous acquisition
- > Real-time analysis for field efficiency
- > Distributed acquisition systems over the ship

Remote Monitoring

- > Random & unrepeatable phenomena



Optimize costs and prevent failure

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



They trust OROS

- > "With my OROS analyzer, I'm really confident during on-board measurements thanks to its toughness and its complete panel of functions."

Chris RINGLE, 44
Noise and Vibration Maintenance Engineer,
Propulsion Department.

OROS Solutions

Enhance your Efficiency

INSTRUMENTS

Flexible Connection

- > Mobile Analyzer
- > Distributed Configuration
- > Remote Access
- > Large Channel Count Systems

Multioptions

- > PC Free Recorder
- > Online & Post Analysis
- > Multianalysis
- > Handling Any Transducers

Made For the Field

- > Portable
- > Rugged
- > Real-Time
- > Multi-Channel

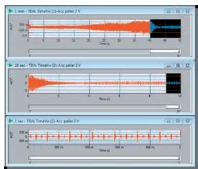
Accurate

- > DSP-based
- > 24 Bit – 40 kHz – 140 dB
- > ± 40 V input range
- > ± 0.02 dB / $\pm 0.02^\circ$



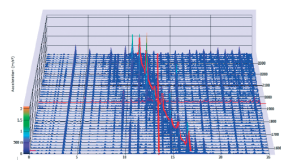
SOFTWARE R&D, Acceptance, Diagnostics

Data Acquisition



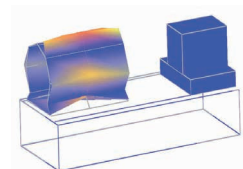
- > Recorder
- > Time Domain Analysis

Rotating Analysis



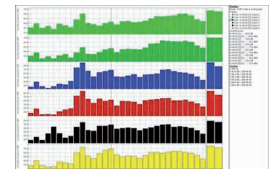
- > Spectral Based Diagnostics
- > Torsion and Twist
- > Synchronous Order
- > Reciprocating Machines Diagnostics: EngineDiag
- > Balancing

Structural Dynamics



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

Noise Analysis



- > 1/3rd octave
- > Sound Intensity

SERVICES Anywhere Close to You



Training

- > Initial
- > Advanced
- > Webinar

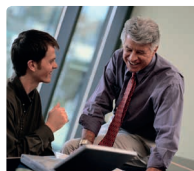


Renting

- > Instruments
- > Software modules

Coaching

- > Software customization
- > Assistance in your measurement
- > Expertise in diagnostics



A Dedicated Team

- > Dynamic and responsive Services department
- > Worldwide hotline
- > Global Accredited Maintenance Centers (worldwide coverage)



Maintenance and Contracts

- > Premium contracts
- > Software updates
- > Hardware upgrades
- > Calibration

Measuring your Ships and Propellers



Rotating Analysis



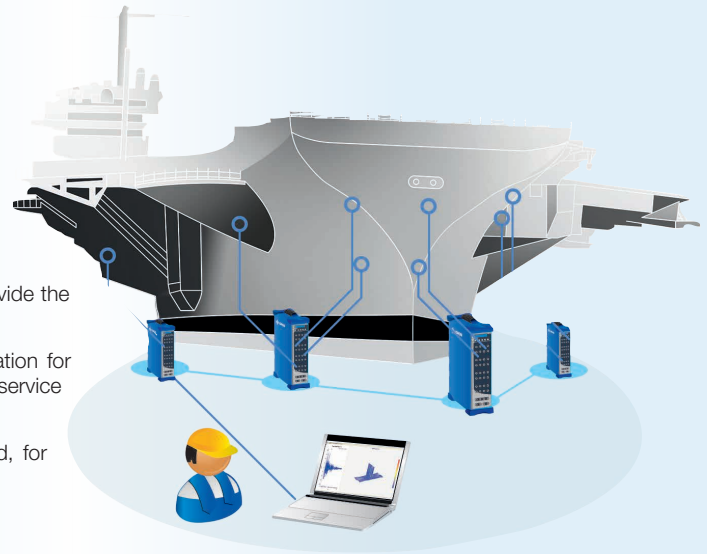
Torsional Analysis

On reciprocating machinery the cause of vibrations often comes from the non-linearity of the angular speed.

Thanks to the **integrated frequency to RPM** converter, the OROS analyzers provide the instantaneous angular speed inside each shaft revolution.

The **analysis of this speed in frequency or time domain** give helpful information for vibrations reduction during prototyping or for source identification while doing service diagnostics.

With **torsional analysis**, detect, follow the torsional resonance of the shaft and, for example, identify problems due to flexible coupling



Reciprocating Machine Analysis

Reciprocating machines are complex installations. They generate specific vibration signatures. The objective is their performance optimization and faults detections. For example, **injection delay**, **valves faults**, **segmentation wear** can be identified with EngineDiag. This software module integrates the machine mechanical properties: number of cylinders, firing order and timing diagram, allowing to provide pertinent decision criteria on the field. Time signal, **overall levels** as well as **angle-frequency representation** on the machine cycle are efficient results for diagnostics.

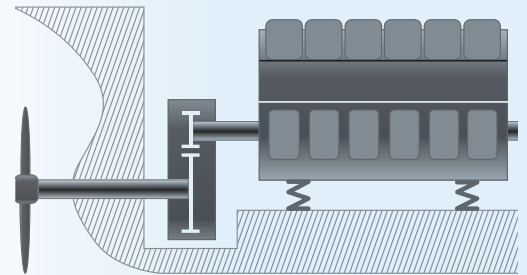


Gear Analysis

Gearboxes is a very critical part of transmission and has specific vibration signature requiring correlation or cepstrum analysis for an accurate diagnostics.

The **correlation** is useful to determine the correlated part of signals from different locations on a structure. This helps tracking the root and cause of vibration phenomena machinery structure and/or cinematic.

The **cepstrum** is an efficient tool to detect periodic shocks in bearings or parts of rotating machinery. It is specially adapted when the spectrum levels are noised with their impulsive components.

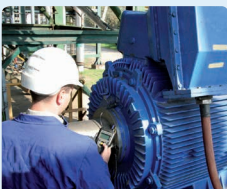


Roller Bearing Analysis

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 and kinematics markers**, part of FFT-Diag module, are the key tools for that purpose.

On-Site Measurements & Applied Trainings

Experts from OROS 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.



ulsion Systems

Shipbuilding

- > Hull
- > Tower
- > Air Conditioning
- > Pumps
- > Compressors

Propulsion Systems

- > Gas Turbines
- > Diesel Engines
- > Generators
- > Motors
- > Gearboxes
- > Flexible Coupling

Structural Dynamics



ODS (Operating Deflection Shape)

A powerful analysis to solve problems related to forced vibrations. Only with few measurement points, determine the source of high vibration level and the structural modifications to be implemented on the machine.



Damping & Isolation

Absorbing and damping mounts are the components through which the vibration energy is transmitted between the engine and the rest of the ship: their properties, dimensions and positions should be determined with care. The techniques used are **cross spectrum**, **transfer functions**, **damping**, as well as **ODS (Operating Deflection Shape)**.



Modal Analysis

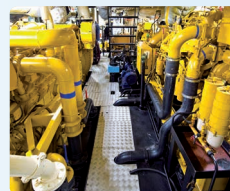
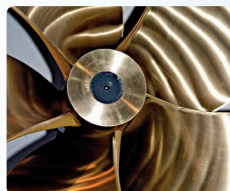
Modal Analysis is one of the key steps when testing machines: it determines their structural characteristics and so, defines how they reacts to operating excitations. **Shaker or impact hammer** excitations can be used to capture the experimental datasets: the final stage is the actual **OROS modal analysis**.

Noise Analysis

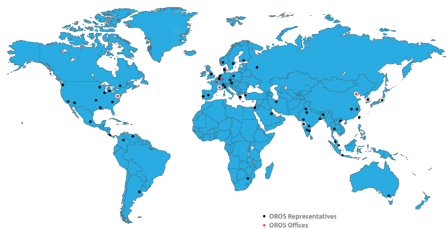


Structure-Borne Noise Analysis

This technique uses acoustics tools, typically 1/3 octave analysis. The results allow to identify and reduce the transmission to Structure-Borne Noise.



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

ORNV-SOA	Synchronous Order Analysis plug-in
ORNV-FFTDiag	Spectral Based Diagnostics software Module (Envelope, Cepstrum, Pk; Pk-Pk, Crest factor, shaft view)
ORNV-IVC	Integrated Instantaneous angular Velocity Converter plug-in, allows on-line and offline torsional analysis
ORNVS-ENGD	EngineDiag, Reciprocating Machines Diagnostics Software Module
ORNVS-BAL	Single Dual Plane 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

Noise Analysis

ORNV-OCT	Real-time filter based 1/n octave plug-in
ORNV-SI	Sound Intensity 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
OR36/8-XPOD-V	3 Display analog and digital voltmeter monitoring XPOD

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 > 140 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	128 to 512 GB SSD
Internal battery	up to 2h
Link to PC	1 Gb/s Ethernet
Weight from	from 1.4 kg/3 lb to 10 kg/22 lb
* Optional features	

M002-100-4*

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