OROS

Noise & Vibration

Measurement and Analysis Solutions

for Marine

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
> Mutichannel real-time processing and diplays
> 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
> Portable and rugged analyzers for field measurements
> Multichannel simultaneous acquisition
> Real-time analysis for field efficiency
> Full signal recording for office processing and archiving

Remote Monitoring

> Random & unrepeatable phenomena

Optimize costs and prevent failure

> Alarm trigerring 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 roughness and its complete panel of functions."*

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

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

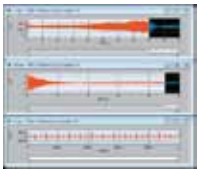
> Remote monitoring
> Autonomous monitoring
> Stand alone recorder

Handling Any Transducers

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

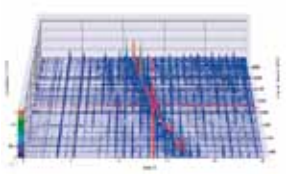
SOFTWARE R&D, Acceptance, Diagnostics

Data Acquisition



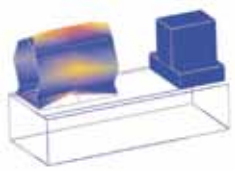
> Recorder
> Time Domain Analysis

Rotating Analysis



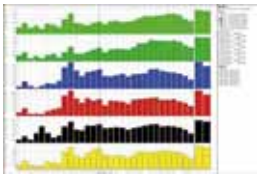
> Vibration diagnostic toolset
> Torsion
> Synchronous Order Analysis

Structural Dynamics



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

Noise Analysis



> 1/3rd octave

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

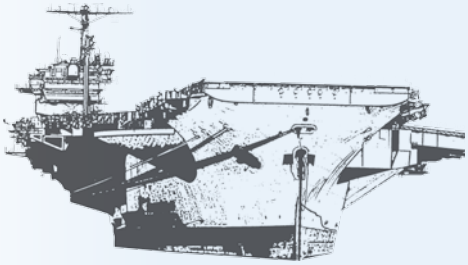
> Dynamic and responsive Customer Care department
> Hotline
> Global Accredited Maintenance Centers (worldwide coverage)

Maintenance and Contracts

> Premium contracts
> Software updates
> Hardware upgrades
> Calibration

Measuring your Ships and Propu

Rotating Analysis



Torsional Analysis

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

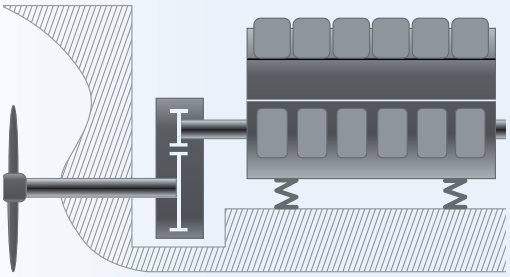
Thanks to the **integrated frequency to RPM** converter, the OROS analyzers provide the instantaneous angular speed inside each shaft revolution.

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

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**, part of FFT-Diag module, is the key tool for that purpose.

Time Frequency Analysis

The objective is to identify defaults of the engine operation: injection pump malfunction, wear of the injectors, burn out of the valves. The **accurate waterfall** displays in function of **time and frequency acceleration information** from the top engine. Defaults can be detected with the intuitive exploration tools.

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.

ulsion Systems

Shipbuilding

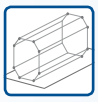
- Hull
- Castle
- Air Conditioning
- Pumps
- Compressors

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.

OROS

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	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
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
ORNV-SYSTEO	Remote / stand-alone solution for machinery monitoring
Noise Analysis	
ORNV-OCT	Real-time filter based 1/n octave plug-in

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

M002-100-3

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MEASURING NOISE & VIBRATION

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