OROS

Noise & Vibration

Test and Measurement Solutions

for Aerospace

ALAVA INGENIEROS

Tecnología a su medida

Matching your Challenging Tests

Portable, Flexible and Accurate Instruments for your Environment

Laboratory measurement & analyses

> Prototype validation
> Sub-systems tests
> Fatigue tests

More acquisition and analyses

> Structural dynamics, rotating analysis and acoustics measurement from the same box
> Cascadable, up to 320+ channels
> Universal inputs ranging from ICP and float to strain gauges and thermocouples

In-flight data acquisition

> Aircraft/airport qualification
> Helicopter/fighter retrofit
> Cabin Noise
> Engine tests

Get accurate and secured data whatever the conditions

> Light, rugged and real-time instruments
> Simultaneous recording, monitoring and analyses
> PC free operations with on board front-panel
> Removable hard drive (HDD or SSD)
> Wireless capable, battery powered
> Shock, vibration and temperature reinforced
> IRIG, GPS

Test center & Transportation

> Satellite & parts tests
> Rockets & jet engine test cells
> Satellite & antenna transportation survey
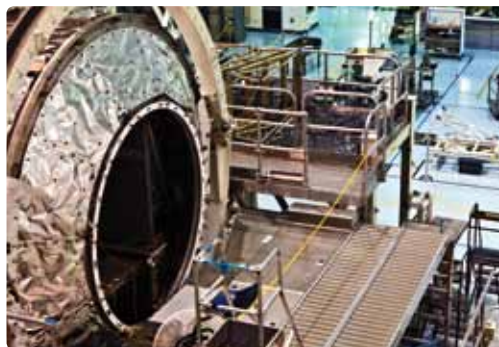
Rack, stand alone or distributed

> Large channel count solution up to 320+ channels
> Thermocouples/RTDs and strain gauges integrated conditioners
> ICP, 200V polarized, float/AC/DC/TEDS inputs
> Stand alone long duration recording with auto power management
> Easy integration with our complete control/command tool kit (NVDrive)
> Wide range of export formats (Mat, ASAM, UFF, Txt, SDF, Wav…)

They trust OROS

> *"I have been using OROS analyzers for quite some time. These instruments continuously deliver accurate and reliable data. From raw data to advanced synchronous order spectra, we have confidence in OROS' measurement certainty. The whole Engineering Vibe Lab trusts the data and finds our reports useful."*

Adam IRVINE, 39
Vibration Program Manager, Rotor & Fixed Wing / In-flight Test Center.

www.oros.com

# Instruments, Software, Services

Rotating Analysis

Synchronous Order Analysis
Based on the famous OROS re-sampling algorithm, the SOA provides spurious free, repeteable and phase accurate order spectra and tracking. Best choice for balancing and jet engine tests cell, it provide repetitive measurements like a metronome.

Shaft torsion
The oversampled inputs measure the instantaneous velocity of shafts. Torsional behavior (resonances, twist) comes simple to measure and analyze.
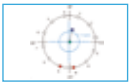
Balancing
Dual plane balancing. Its guided interface feature fast and accurate balancing of jet engine fan or any shaft in the aircraft.

Data Acquisition

Recorder
Integrated in the analyzer it allows triggered or free run parallel throughput on multiple bandwidths to ensure a perfect measurement backup. A large set of export formats are supported, from Matlab® to ASAM ODS.

FFT
Features all the spectra and cross functions to cover the parts, sub-systems and structures frequencies. Flexible triggering functions, time or spectral averaging and various resolution, allow isolating accurately the targeted signatures.

Time Domain Analysis
Running simultaneously with the FFT, it offers a comfortable scope view of the signals to monitor. A comprehensive detectors set extract the signals content (RMS, DC, Pk, etc) collecting the applied or generated power and motions statistics.

Made for the Field, Flexible, Accurate

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

PC Free Operations

> Autonomous Monitoring
> Continuous recording

Plug and Play Signal Conditioning

> Strain gauges (Xpod)
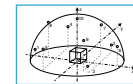> Temperature (Xpod)
> CAN Bus

Structural Dynamics

Modal Analysis
An advanced module to carry full modal analysis including EMA (Experimental Modal Anaysis) and OMA (Operational Modal Analysis). Allows to calculate and display modal frequencies, damping and shapes.

Noise Analysis

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

1/3rd Octave
1/n Octave filter based analysis for acoustic levels, signature and source investigation. This module provides the perfect solution for the aircraft/airport noise regulation checking procedures.

Anywhere Close to You

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

Rotating Analysis

Jet & Rocket Engines Test

Propulsion safety is critical for the aero industry. **The OROS analyzers record raw data** and display the information you need for proper jet engine test. Thanks to the **Synchronous Order Analysis,** they compute the orders of jet engines during hours of tests required by the **propulsion tests centers** or flight/taxi tests. The **integrated conditioners** offer a wide range of transducer interface (ICP, Float, ±40 V, Strain gauges, Thermocouples, PT100, Oversampled tachs). With the data and control/command tool kit (NVDrive®) the analyzer is **easy to integrate in the test benches.**

Helicopter Transmissions

Multi-shaft order analysis provides **synchronous order extraction** from the helix and the turbine. Vibrations related to **gears** are extracted with the **FFT-Diagnostics tool. Absolute and relative torsional motions** are acquired and analyzed with the **integrated high speed torsional inputs.**
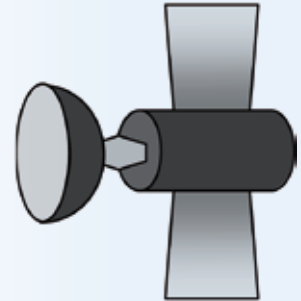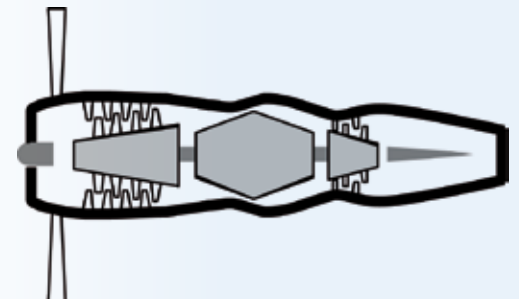
Data Acquisition

In-Flight Recording

The different components installed in a aircraft are tested in-flight to validate their integration. It requires a **portable, rugged and easy recording system.** **PC free recording** is especially very useful for the toughest conditions (D-rec, Direct Recording)

Fatigue Test

The XPod plug and play bridge conditioner measures dynamic **strain** and temperatures for life duration analysis of critical parts such as the **aircraft body, engine blades or wings fixtures. The removable conditioner** can remain connected to the strain/thermocouples, reducing cabling time.
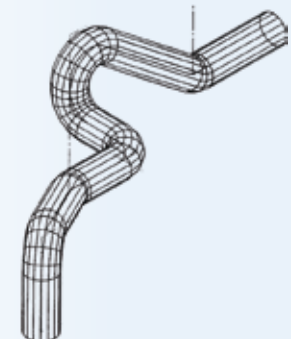
ur Aerospace Applications

Aircraft - Helicopter

> Fighter

> Commercial

> Rescue

> Simulator

Satellite - Defense

> Drone

> Radar / Antenna

> Spacecraft

> Rocket

Aero Engines

> Jet

> Turbines

> Turbo propellers

Sub-systems

> Air conditioning

> Coupling parts

> Transmission

> Power Generation

Structural Dynamics

Modal Analysis

Modal Analysis is one of the key steps when testing **component prototypes:** 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.**

Structures Test

Spacecraft structures are checked with the large **channel distributed systems** (VibeMaster). It measures simultaneously **up to 320+ channels** for one shot tests. From **shaker or loudspeaker** excitation the **FFT, 1/n Octave and swept-sine** offer real-time monitoring and provide immediate results and raw data making the test conclusions faster.

Noise Analysis

Cabin Noise

Large channel distributed systems (VibeMaster) allow recording **hundreds of microphones** located in aircraft passenger cabin, identifying HVAC noises. Thanks to the swappable Mobi-Disks, the next test can be launched immediately. **The real-time acoustic computation** (Leq, **1/n Octave**) monitors the measurements quality, while the **recorder** provides secured data. To reach locations with restricted area, a SmartRouter (controller unit) is used with its **wireless capabilities.**

Jet Engine Sound Power

The OROS Sound Power software module simultaneously acquires up to **21 microphone's locations signals,** reducing dramatically the measurement time of aircraft and helicopter **jet engines.** With a **Class 1 type results,** it fulfills acoustics **test benches requirements.** OROS Sound Power offers a **repeatable and standards compliant** solution for testing noise emitted by aircraft sub-systems such as air conditioning, fans and electric motors.

Ordering Information

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

OROS designs and manufactures noise and vibration signal analyzers, dedicated solutions and offers related services. It 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.

Instruments

Examples of configurations

OR35-FREQ-8	8 ch 20 kHz real-time frequency analyzer, universal inputs
OR36-FREQ-16	16 ch 20 kHz real-time frequency analyzer, universal inputs
OR38-FREQ-32	32 ch 20 kHz real-time frequency analyzer, universal inputs
ORMP-REC-16	Mobi-Pack™-16 Ch. 40 kHz recorder, 60 GB removable HDD
OR38-REC-24	40 kHz recorder, 60 GB removable HDD, PC or PC free operations

Inputs Conditioners

OR36/8-XPOD-B	8 ch. strain gauge bridge conditioner for OR36 & OR38
OR36/8-XPOD-T	8 ch. PT100 and thermocouple conditioner for OR36 & OR38

Distributed Systems

ORVM-NG-300	300 ch supervisor software license
ORSM-SAT	SmartRouter Satellite, Autonomous analyzer controller.

Vibration Analysis Software Modules

ORNV-TDA	Time Domain analysis plug-in
ORNV-FFT	Real-Time FFT analysis plug-in

Rotating Analysis Software Modules

ORNV-SOA	Real-time synchronous order analysis plug-in
ORNV-IVC	Instantaneous angular velocity converter for torsion acquisition
ORNVS-BAL	2 plane balancing software for 3-Series analyzer

Structural Dynamics Software Modules

ORNVS-MOD330	ODS + EMA SIMO
ORNVS-MOD350	ODS + EMA SIMO + EMA MIMO
ORNVS-MOD380	ODS + EMA SIMO + EMA MIMO + OMA

Noise Analysis Software Modules

ORNV-OCT	real-time filter based 1/n Octave analysis plug-in
ORNV-SP	Sound Power software

Specifications

Channels count	**2 to hundreds of channels**

Universal Inputs

Sampling:	2 kS/s to 102.4 kS/s - 24 bits synchronous sampling
Accuracy:	Phase ±0.02° - amplitude ±0.02 dB - Dynamic > 120 dB
Conditioning	AC/DC/ICP/Float/TEDS, ±100 mV to ±40 V
Parametric channels	10 S/s - 50 Hz/60 Hz rejection - reproducibility < 1 mV
Optional conditioners Thermocouples, PT100, Wheatstone bridge (strain, force and pressure)	

Analysis

Spectral (FFT):	6401 lines, FRFs, time or spectral averaging
Acoustics (OCT)	1 to 1/24th octave, filter based, A,C, etc weighting, fast/slow/impulse
Time fomain (TDA)	300 ms to 110 hours time view, DC/RMS/Pk/Pk-Pk/Crest-factor/kurtosis
Sync Order (SOA)	1/32 to 1 order res., up to order 400, Phase/amplitude, 8 tracked order/ch

System

Hard disk	HDD or SSD record
Internal battery	up to 1h 30min
Link to PC	100 Mbit/s Ethernet
Weight	from 1.4 kg/3 lb to 10 kg/22 lb

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