DEWESoft®

ORDER TRACKING AND ANALYSIS

SOLUTION DATASHEET

V21-1

Analysis of vibration signals and determination of rotational dynamics
The ideal tool for rotating machinery diagnostics

⚠ ORDER TRACKING AND ANALYSIS

INTRODUCTION

The order tracking method is the true health scan for rotating machinery. With Order Analysis, you can optimize the operation of your machine, reduce wear and prevent failures. Less wear means a lesser need for maintenance and lower overall running costs.

The Order Analysis is used for, e.g., vibration analysis on engines or other rotating machinery, in development and optimization, and diagnostics and troubleshooting instances.

The Order Analysis software module allows you to identify causes of vibrations, determine stable and unstable operation points, setup tolerance and alarm limits on individual rotating parts, inspect structural influences such as resonances, and much more.

This powerful, flexible software along with DewesoftX acquisition and analysis software and freely configurable Dewesoft instruments,

makes up for a smart, powerful solution that covers a broad range of applications. In combination with other modules like torsional vibration analysis, combustion analysis, or power analysis, Order Analysis provides complete diagnostics of generators, combustion engines, and rotating shafts.

FUNCTIONALITY

The rotational speed of rotating machines produces repetitive vibrations and acoustic noise with variations in the rotational speed. Order tracking is the measurement technique that allows you to sort out all the signal components generated by an operating machine.

The order tracking method is used to extract the harmonic components related to the rotational frequency of the machine in e.g., gears,

belts, fans, pumps, compressors, and turbines. Orders are harmonics of the rotational speed, and evaluating these orders is critically important in many types of rotating machines. Typically order tracking and analysis are done on non-stationary data, such as a run-up or coast-down of a machine.

The rotational vibration pattern of machines is a mixture of excitation frequency components, from which specific problems are revealed, such as imbalance, mechanical looseness, bearing faults, and machine response functions its natural frequencies based on structure and mounting.

The measured vibration sensor data is calculated according to the angle sensor data and split up into orders, which you can analyze across the whole rpm range. The powerful visualization and mathematical options provide a clear picture of the machine state and specific harmonic components which determine relations to certain machine faults.

APPLICATIONS

Rotating machines are a major and critical component of many mechanical systems throughout industries. Almost every industrial process uses at least one rotating machine, which is crucial in the production line.

Engines, power trains, turbines, pumps, compressors, electric motors, ventilation units, etc. can be designed and developed, as well as evaluated and maintained by performing order tracking and analysis:

- Investigation and troubleshooting of instabilities in rotating machinery
- Determination of critical speeds
- Gearbox failures
- Bearing element failures
- Mechanical looseness
- Imbalance
- Bent shaft
- Misalignment
- Electrical faults in motors
- Cavitation in pumps
- Separation of rotational and structural noise and vibration phenomena
- Other vibration-related problems in e.g., gear, belts, fans, pumps, compressors, and turbines.

PROXIMITY PROBES

RPM SENSOR
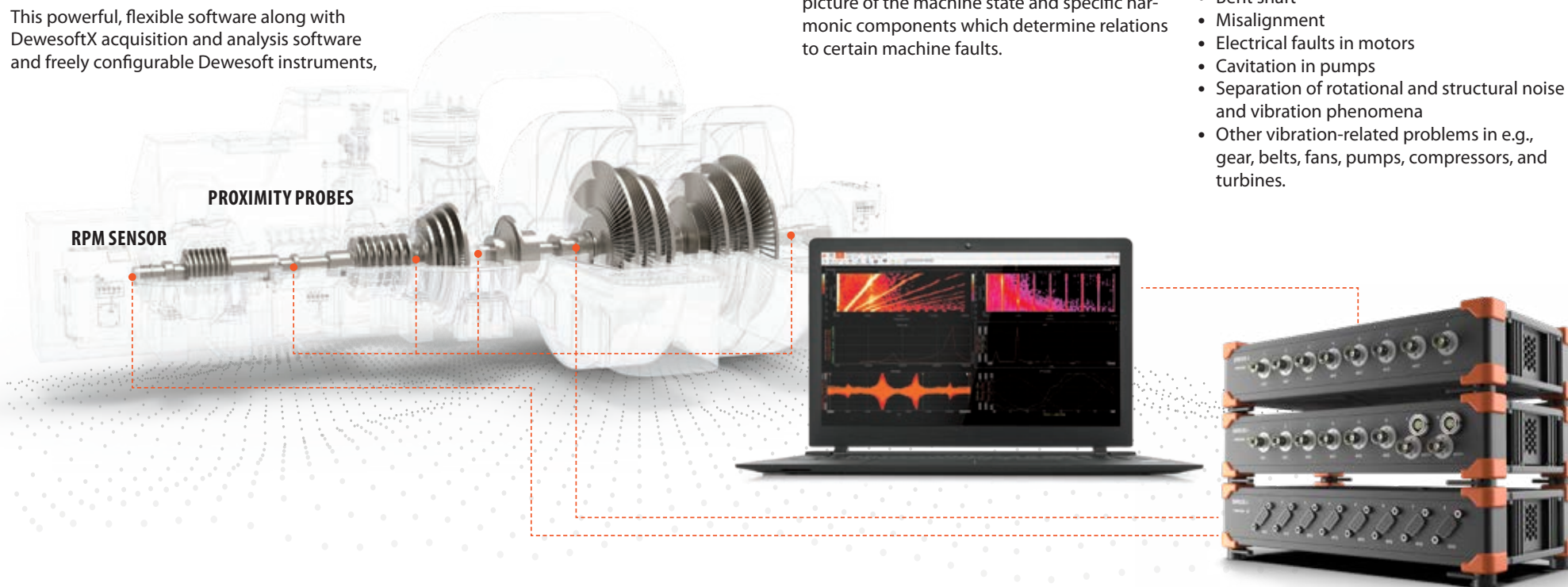
BENEFITS

SIMPLE CONFIGURATION – STRAIGHTFORWARD INTERFACE
The DewesoftX software is designed for your testing. Configure all with just a few clicks - simply select your input channel and the needed type of output.

ADVANCED FUNCTIONALITY – YET EASY TO USE
Advanced does not have to be complicated. Connect sensors, assign inputs and start measuring. No need for coding or complex configuration to get exactly what you need.

FLEXIBLE AND CUSTOMIZABLE – MORE USES
Customize your DAQ system and get the right configuration for your job. Perform additional types of analysis along with the Order Analysis - all with Dewesoft quality and accuracy.

UNLIMITED INPUT – MORE SENSORS AT ONCE
The unique Dewesoft architecture allows you an unlimited number of input channels with simultaneous acquisition and analysis of data from many sensors - all synchronized.

FREE ADDITIONAL FEATURES – POWERFUL CORE SOFTWARE
DewesoftX with an easy-to-use flexible interface comes with the hardware and lets you process, store, visualize, export, and report your data. Use tools such as FFT analysis, filtering, math formulas, and statistics.

FUTURE-PROOF – FREE LIFETIME UPGRADES
No hidden fees for software upgrades and updates - backward compatibility guaranteed. Frequently updated with new and useful functionalities.

KEY FEATURES

HARMONIC ORDER EXTRACTION
Full or fractional order extraction with amplitude and phase coupled with multiple representation options vs. rotational speed and in the time domain. Complete graphic representation of as many orders as you want.

EXPANDABLE AND MULTI-FUNCTIONAL
Get in-depth insight into the machine dynamics by adding more SW plugins, such as FFT, Orbit analysis, or Torsional and rotational vibration analysis. Add more sensors to simultaneously capture synchronized temperature, video, strain, sound, etc.

MULTIPLE DATA DOMAINS, SIMULTANEOUSLY
Your data is available in all domains - time, frequency, angle, and order. Analyze all data at the same time - set up the analysis view exactly as you please.

DIRECT GEARBOX SUPPORT
Use a single-speed source and perform extraction on different gear stages of your machine by using the tacho divider and multiplier functionality.

USER-DEFINED REFERENCE TAG-AXIS
Analyze order spectra and harmonics over time, speed, or other reference channels of your choice. Inspect order levels vs. temperature, wind speed, flow, or thrust. Channels defined as reference tags let you correlate the order spectra with other measured quantities.

RICH AND COMPREHENSIVE VISUALIZATION
Use 3D frequency and order plots, to determine the health of your machine. Orbit, Nyquist or Bode plots, and Campbell diagrams can present your data.

ALL FREQUENCY SOURCES
You are covered with any sensor to determine the angle and rotational speed - from analog to digital tacho, encoder, gear tooth with full, missing, or double teeth, tape sensors, and more. Connect the sensor to the counter input and measure with 10 nanoseconds resolution using Dewesoft Supercounter technology.

SPECTRAL WEIGHTINGS
Single or double, integration or derivation, A or C frequency weighting are supported - all you need in a single setup screen.

CONFIGURABLE AVERAGING AND UPDATE CRITERIA
The defined delta splits the reference quantity range into corresponding classes for calculation. Hysteresis prevents jumps between classes. Data is collected continuously or at the center of the bin. Updates can be set to use the first bin values, the newest, the averaged, or the max values.

◆ SPECS

Analyzer: SIRIUSm 3xACC 1xACC+

Input type	Voltage, IEPE	
ADC type	24bit delta-sigma dual-core with anti-aliasing filter	
Sampling rate	Simultaneous 200kS/sec	
Ranges (Dual Core Low Range)	**±10V (±500mV)**	**±500mV (NA)**
Input Accuracy (Dual Core)	±0.1 % of reading ±10 (1) mV	±0.1 % of reading ±1 (NA) mV
Dynamic Range @ 10 kS (Dual Core)	-140 dB (-160 dB)	-135 dB (NA)
Typ. Noise floor @ 50 kS (Dual Core)	-107 dB (-125 dB)	-100 dB (NA)
Typ. CMR @ 50 Hz / 1 kHz	140 / 120 dB	140 / 120 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K	
Offset Drift	Typical 0.5 µV/K + 2 ppm of range/K, max 2 µV/K + 10 ppm of range/K	
Gain Linearity	<0.02 %	
Inter Channel Phase-mismatch	0.02° * fin [kHz] + 0.1° (@ 200 kS/sec)	
Channel Crosstalk	<-160 dB @ 1 kHz	
Input Coupling	DC, AC 0.1 Hz,1 Hz	
Input Impedance	1 MΩ (270 kΩ for AC coupling ≥1 Hz) in parallel with 100 pF	
Overvoltage Protection	In+ to In-: 50 V continuous; 200 V peak (10 msec)	
IEPE mode		
Excitation	2, 4, 8, 12, 16 or 20 mA	
Compliance voltage	25 Volt	
Output Impedance	>100 kΩ	
Sensor detection	Shortcut: <4 Volt; Open: >19 Volt	
Counters (ACC+ type only)		
Inputs	1 digital counter input, 3 digital inputs, Fully synchronized with analog data	
Counter Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor	
General Counter Specifications	See "SIRIUS counter specifications"	
Additional Specifications		
Input connector BNC	BNC or TNC (others on request)	
TEDS support	IEPE mode only	

SOFTWARE: DewesoftX

Recommended	
Processor:	Intel Core i7 with 4 Cores (3rd generation or higher)
RAM:	8 gigabyte (GB)
Hard drive:	Solid-state drive (SSD)
Graphic card:	Compatible with DirectX 11
Display	1280x720 (HD Ready)
Operating system:	Windows 10 64-bit

*Actual requirements may be different due to specific setup configuration.

RELATED PRODUCTS

- FFT Analyzer
- Orbit analysis
- Torsional vibration
- Balancing
- SLM

TYPICAL CONFIGURATIONS

BASIC: DEWESOFT-OPT-ORDTR

- SIRIUSm-3xACC 1xACC+
- 4x I1A-50G-1 - Series Miniature Accelerometer
- 1x DS-TACHO2: Optical tacho probe with LED light

INTERMEDIATE: DEWESOFT-X-ROT-MAC-ANALYZER

- SIRIUSi 6xACC 2xACC+
- 8x I1A-50G-1 - Series Miniature Accelerometer
- 2x DS-TACHO2 - Optical tacho probe with LED light

ADVANCED: DEWESOFT-X-ROT-MAC-ANALYZER

- SIRIUS R8 56xACC 8xACC+
- 64x I1A-50G-1 - Series Miniature Accelerometer
- 8x DS-TACHO2 - Optical tacho probe with LED light

OPTIONAL:
DEWESOFT-X-ORBIT-ANALYZER
DEWESOFT-X-DSA
DEWESOFT-X-ENTERPRISE

- I3A-50G-1 Series -Triaxial accelerometer
- I1A-50G-1 - Series Miniature Accelerometer
- DS-TACHO3 - Optical Tacho probe with laser light
- DS-TACHO4 - Optical high-speed tacho/tape probe with laser light
- GRAS 146AE - 1/2" Free Field Microphone IP67

◆ DEWESoft®

LEARN MORE:
dewesoft.com/applications/
rotating-machinery/order-tracking

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