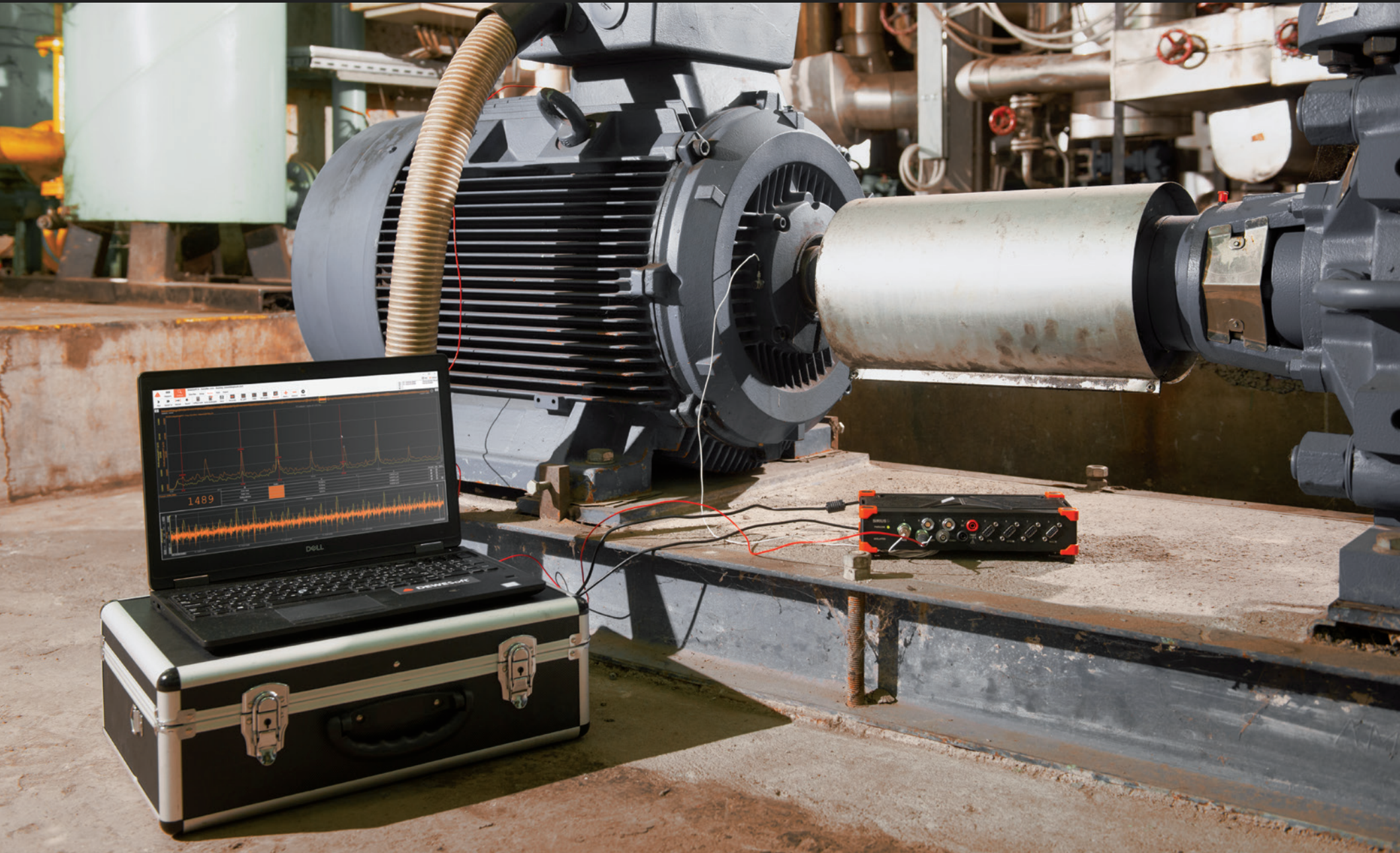


# BEARING ENVELOPE ANALYSIS

PRODUCT DATA

BEA2019 - V1.1.

THE EASY TO USE TOOL TO MONITOR BEARINGS,  
AND TO DETECT AND DIAGNOSE BEARING FAULTS



# INTRODUCTION

In any manufacturing or processing plant where rotating equipment is used, bearing failures are the most common machine faults. To ensure reliable operation vibration analysis is used for machine diagnosis, including condition monitoring and fault diagnosis of rolling element bearings.

Bearing Envelope Analysis (BEA) enables detection and diagnosis of faults on bearings by extracting periodic impacts from a machine's vibration signal.

The Dewesoft Envelope Analysis offers a value-for-money solution based on a combination of first-class data acquisition units and powerful software. It provides an easy to use interface and fast configuration with all functionality, including recorder, bearing database, freely definable envelope, and signal bandwidth as well as predefined bandwidth settings (Envelope 1 - 4).

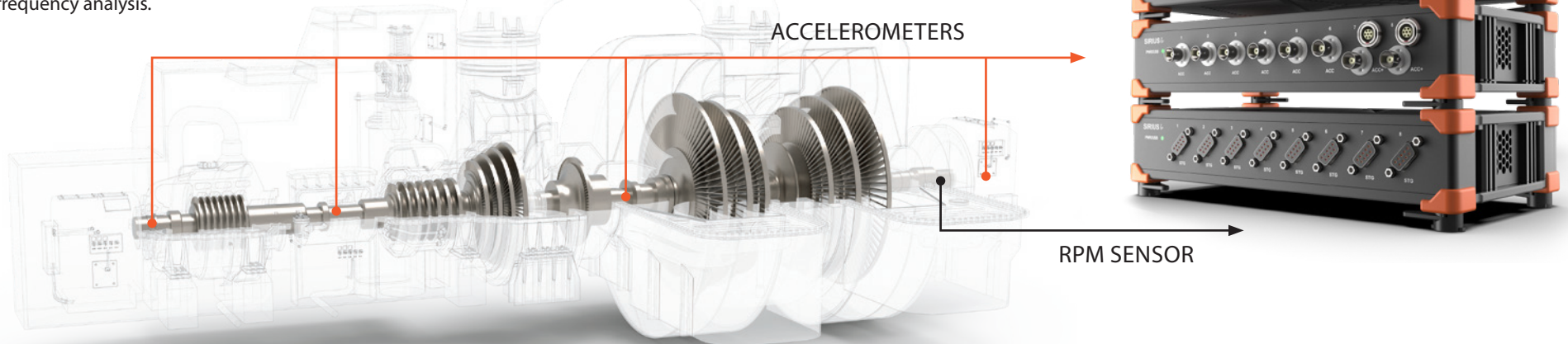
# FUNCTIONALITY

Envelope analysis is a technique to detect and diagnose faults on roller bearings. Bearing Envelope Analysis is based on demodulation of the high-frequency resonance associated with bearing element impacts.

When the elements strike a local fault, an impact is produced. These impacts have different typical repeating frequencies depending on the geometry of the bearing and the rotational frequency. The repetition rates or bearing frequencies are unique for each type of bearing and are calculated according to fixed mathematical formulae.

The impacts modulate a signal at the associated bearing pass frequencies, such as Cage Pass Frequency (CPF), Ball Pass Frequency Outer Race (BPFO), Ball Pass Frequency Inner Race (BPF1), and Ball Fault Frequency (BFF).

Envelope Analysis is based on the FFT (Fast Fourier Transform) frequency spectrum of the modulating signal. When the original signal is amplitude modulated, the envelope analysis extracts the modulating signal (amplitude demodulation). The result is the time history of the modulating signal. This signal can be studied directly in the time domain or it can be subjected to frequency analysis.



# SUPPORTED SENSORS

We support most industry-standard Accelerometers with BNC connection and Voltage, IEPE and Charge output. Our patented DualCoreADC® technology allows you to measure a large range of signal amplitudes without the need to switch between ranges. With the benefit of one additional counter per channel, ACC+, you can measure Vibration an RPM with full synchronization and in a compact format.

Connector types: BNC,

- Input options: Voltage, IEPE, Charge
- Supported sensors: Single or multi-axial accelerometers
- Speed acquisition options: Tacho, Tape sensor, Encoder, geartooth or any RPM sensor with 5V TTL signal output.
- Speed acquisition inputs: Counter, Analog in with Angle Math

# APPLICATIONS

Envelope analysis is applied in industries using rotating machinery, e.g. steel, paper, chemical or textile production, generating power.....

## Non-intrusive roller bearing health monitoring

Identification of cracks in both inner and outer race of bearing, determining roller defects or wear and poor lubrication.

# KEY FEATURES



## MULTI-PURPOSE ADVANCED MARKERS

Bearing marker - shows the position of bearing faults in the frequency spectrum, max marker, free marker, zoom marker, sideband marker, harmonic marker.

## KINEMATIC MARKERS

Different machinery sets can be created in a database. Simplified fault detection during measurement through adjustment of all markers when main frequency is changed.

## MULTIPLE BANDWIDTHS

Predefined bandwidth settings (Envelope 1 - 4) or freely definable envelope and signal bandwidth. Multiple bandwidths simultaneously.

## ANY LINE RESOLUTION

Freely selectable line resolution for most demanding tasks

## EXPORT

Data export to most often used formats: UNV, Excel, Matlab, Flexpro, TXT, CSV...)

## AVERAGING

Block history with linear, peak, exponential averaging or overall calculation.

## DATA

Time-domain data together with frequency domain data.

## CURSOR VALUE ESTIMATE

Innovative window interpolation technique allows precise amplitude and frequency estimation.

## BEARING DATABASE

Possibility to add a custom bearing to the database.

# SPECS

DAQ SYSTEM - SIRIUS ACC TYPE INPUT		
<b>Inputs</b>		
Input types	Voltage, IEPE	
ADC Type	24bit delta-sigma dual core with anti-aliasing filter	
Sampling Rate	Simultaneous 200kS/sec	
<b>Ranges (Dual Core Low Range)</b>	<b>±10V (±500mV)</b>	<b>±500mV (NA)</b>
Input Accuracy (Dual Core)	±0.1% of reading ±10(1)mV	±0.1 of reading ±1(NA)mV
Dynamic Range@10kS (Dual Core)	140 dB (160 dB)	135 dB (NA)
Typ. SNR@50kS (Dual Core)	107 dB (125 dB)	100 dB (NA)
Typ. CMR @ 50Hz/1kHz	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 Cross talk	>160 dB @ 1kHz	
Input Coupling	DC, AC 0.1 Hz,1Hz	
Input Impedance	1 MΩ (270kΩ for AC coupling ≥ 1Hz) in parallel with 100pF	
Overvoltage Protection	In+ to In-: 50V continuous; 200V peak (10msec)	
<b>IEPE mode</b>		
Excitation	2, 4, 8, 12, 16 or 20mA	
Compliance voltage	25 Volt	
Output Impedance	>100 kΩ	
Sensor detection	Shortcut: <4Volt; Open: > 19Volt	
<b>Additional Specifications</b>		
Input connector BNC	BNC	
TEDS support	IEPE mode only	

SOFTWARE: DEWESoft X3	
<b>Recommended</b>	
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.	

TYPICAL CONFIGURATIONS	
<b>BASIC Bearing (4Ch):</b>	
<ul style="list-style-type: none"> <li>Sirius MINI 3xACC, 1xACC+</li> <li>Accelerometer (1x-4x)</li> </ul>	
<b>STANDARD Bearing (8Ch):</b>	
<ul style="list-style-type: none"> <li>Sirius Dual core 6xACC, 2xACC+</li> <li>Accelerometer (1-8)</li> </ul>	
<b>OPTIONAL:</b>	
<ul style="list-style-type: none"> <li>Tacho</li> </ul>	
<b>ADVANCED Bearing:</b>	
100+ ACC or CHG channels in configuration of chained Sirius slices or Krypton	

RELATED PRODUCTS	
<ul style="list-style-type: none"> <li>FFT</li> <li>Order tracking</li> <li>Torsional vibration</li> <li>Balancing</li> </ul>	



**LEARN MORE:**  
[dewesoft.com/applications/rotating-machinery/fft-analyzer](https://dewesoft.com/applications/rotating-machinery/fft-analyzer)

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