Vibsens-Pro®
Condition Monitoring Software

FEATURES

- ✓ Compatible with Vibsens measurement systems
- ✓ Supports VA-2000, V6000, V400 measurement devices
- ✓ Automatic signal measurement and recording
- ✓ Continuous alarm checking and event logging
- ✓ Online and offline data review and analysis
- ✓ User-friendly and simple to use software
- ✓ Micorsoft® Excel report
- ✓ Supports 32 & 64 bit versions of Windows® 7,8, 8.1, 10 & XP
- ✓ Support Server and Display Client Mode

APPLICATIONS

- ✓ Rotating machinery vibration measurement
- ✓ Machinery fault analysis
- ✓ Rigid & flexible shaft balancing
- ✓ Structural modal analysis
- ✓ Digitization and recording of continuous long-duration waveforms
- ✓ Modal Analysis & FRF measurements
- ✓ Sound measurement

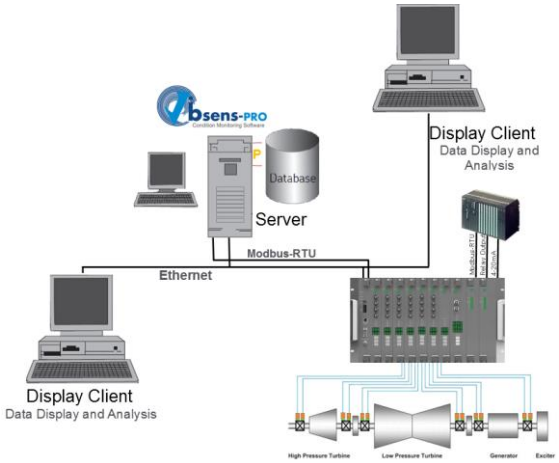
Vibsens-Pro® General Description

Vibsens-Pro® is a vibration measurement and analysis software customizable for different Vibsens products with different capabilities. Vibration measurement is provided by a fully compliant software with required standard specifications for a condition monitoring system. Besides, highly efficient signal processing procedures are used to ensure rapid response to operational issues. The signal processing of very low to high frequency vibrations has been addressed by the use of flexible sampling rates and frequency spectrum resolution may be changed by user easily. Software offers user friendly graphical interface for configuring the sensor inputs, the alarm options, logging, recording etc. and has been designed to work with a variety of sensors both in Metric and Inch systems. All diagnostic data is accessible in both online & offline mode for analysis and troubleshooting. If needed, one computer is installed as server and other computers can access the recorded data across LAN network. Vibsens-Pro is machine condition monitoring software which acquires, measures & monitors data from Vibsens measurement systems and can send data over local or wide area networks for other clients. It provides static (Modbus protocol) and dynamic data acquisition and analysis; wide display choices such as overall vibration level, trend monitoring, time waveform, frequency spectrum, orbit plot, polar plot, waterfall, bode plot, DC gap plot, bearing damage frequencies and much more. It can be connected to all standard Microphone, Tachometer, ICP™, AC, DC inputs from 3rd party manufacturers and is also able to interface with Modbus TCP Server or OPC server from 3rd party which makes the plant management more efficient. In conclusion, while being flexible and functional, Vibsens-Pro is a need for conditioned based maintenance.

Technical highlights of Vibsens-Pro:

- ✓ Online mode for live data acquisition and monitoring
- ✓ Offline mode for history matching and previous data review
- ✓ User friendly interface for instant data analysis with minimal training required of field staff
- ✓ Static , dynamic and process data collection and monitoring
- ✓ Readily integrates with third party vibration control systems and process monitors with minimum hardware requirements by parallel configuration
- ✓ Multiple digital I/O Protocols, such as Modbus RTU/ TCP
- ✓ 24 hour notification through on site alarms & operator interface

The architectural layout for the system is shown in the following. As depicted, sensors and transducers are wired in site to VibSens VA2000, V6000 or V400. Data gathered by the system is transmitted to the condition monitoring software via local area network or other on-site available wired or wireless connection technologies.



VibSens Condition Monitoring System Layout

Vibsens-Pro® hardware compatibility

Vibsens-Pro® software is designed to make use of VibSens hardware modules. A brief comparison of hardware features of VibSens products is summarized in table below.

Parameter	VD-5	V400	VA-2000	V6000
Type	Portable data collector	Machinery protection system with optional condition monitoring	Condition monitoring system	Machinery protection system with condition monitoring
Number Of Inputs	1	4	24	28
Max. Sampling Frequency (KHz)	4	4	12 (24 Ch.) to 40(3 Ch.)	4
Max Number Of Samples	4000	4000	36000 (24 Ch.) to 300000(3 Ch.)	4000
Max. FFT Bandwidth (Hz.)	2000	2000	6000 (24 Ch.) to 20000(3 Ch.)	2000
Max. FFT Resolution (Hz)	1	0.25	0.33 (24 Ch.) to 0.15(3 Ch.)	0.25
Relay Protection	×	✓	×	✓
Data Transfer System	USB Connection	RS-232/RS-485 Connection	TCP/ IP Network Connection	TCP/ IP Network Connection
Data Transmission	Offline	Online	Online	Online
Input Types	Accelerometer	Accelerometer Velocity sensor Displacement sensor Tachometer	Accelerometer Velocity sensor Displacement sensor Tachometer Impact hammer Microphone	Accelerometer Velocity sensor Displacement sensor Tachometer
SCADA Data Transfer	×	Modbus / 4-20mA	×	Modbus / 4-20mA

Vibsens-Pro® Software modules

The Vibsens-Pro® software architecture consists of different functions & modules. Each hardware device can make use of some of these features. Available functions for different devices is shown in table below:

Parameter	VD-5	V400	VA-2000	V6000
Time Signal	✓	✓	✓	✓
Trend	✓	✓	✓	✓
FFT Spectrum	✓	✓	✓	✓
1 Plane Balancing	×	✓	✓	✓
2 Plane Balancing	×	✓	✓	✓
Ball Bearing, Belt, Motor & Gearbox Diagnosis Module	✓	✓	✓	✓
Waterfall / PSD/ Power Spectrum	✓	✓	✓	✓
Envelope Spectrum	✓	✓	✓	✓
FFT Mask	✓	✓	✓	✓
Order Analysis (Order Spectrum, Orbit, Bode Polar, DC Gap)	×	✓	✓	✓
RPM & Phase Measurement	×	✓	✓	✓
Modal analysis (Mag-Phase, Real-Imaginary, Nyquist, Coherence)	×	×	✓	×
Acoustic analysis (Octave, Sharpness, Roughness, Loudness)	×	×	✓	×
Microsoft ™ Excel Report	✓	✓	✓	✓

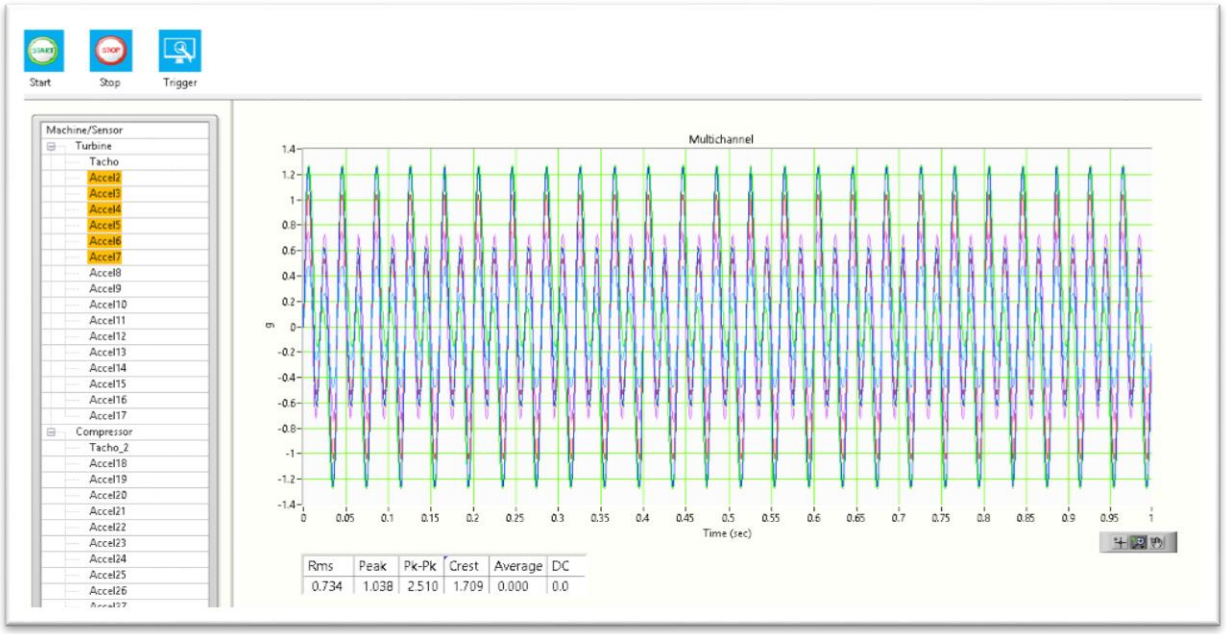
Introduction to software features:

Time Signal

Time waveform is the fundamental graphic presentation of machinery dynamic data. It shows how a single parameter (most often displacement, velocity, or acceleration, but also any other dynamic measurement) from a single transducer changes on a very short time scale, typically a fraction of a second. This is in contrast to trend plots, which display the value of a slowly changing parameter over a much longer time scale, typically hours to months.

A time waveform plot represents a small slice of time in the vibration history of the machine. Usually, the amount of time involves only a few revolutions of the rotor. During this short length of time, the overall behavior of the machine is not likely to change significantly. However, unfiltered time waveform plots can clearly show a change in machine response if sudden events occur in the machine or if the machine is rapidly changing speed (such as an electric motor startup). Time waveform plots have several important uses. They have the advantage in being able to clearly display the unprocessed output from a single transducer. This allows us to look for noise on the signal or to detect the presence of multiple frequency components. An important use of a time waveform plot is to identify the presence and timing of short term transient events like rubs. Large amounts of information such as rub, peak-to-peak amplitude, the filtered vibration frequency, the rotor speed, the nX amplitude and phase of a filtered signal can be obtained from a time waveform plot.

Time signal window shows the time waveform in two types, selected frame and all frames. In selected frame mode graph shows the time frame which has been selected in waterfall tab of frequency domain menu and all frame shows all the data chosen in data selector tab.

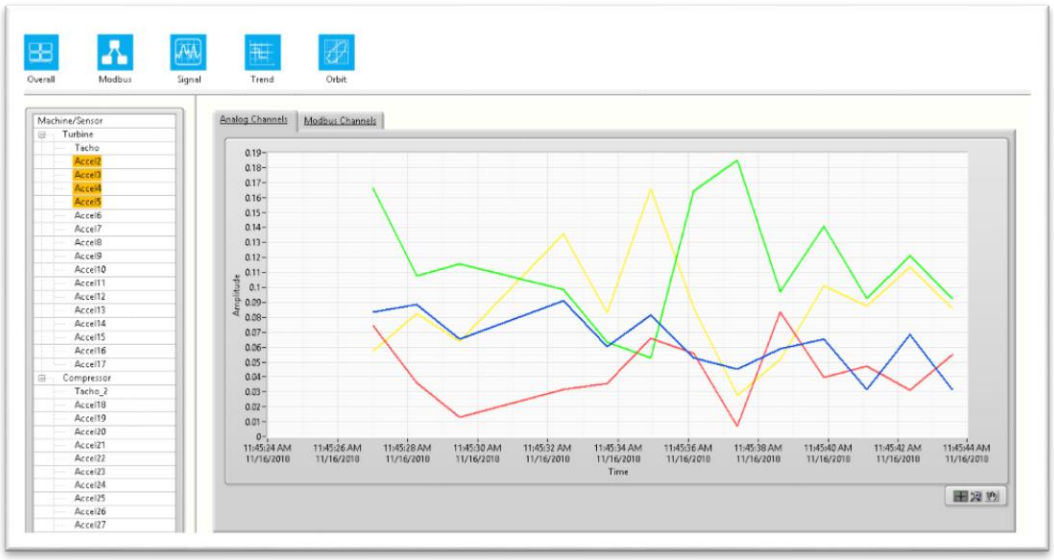


Trend plot

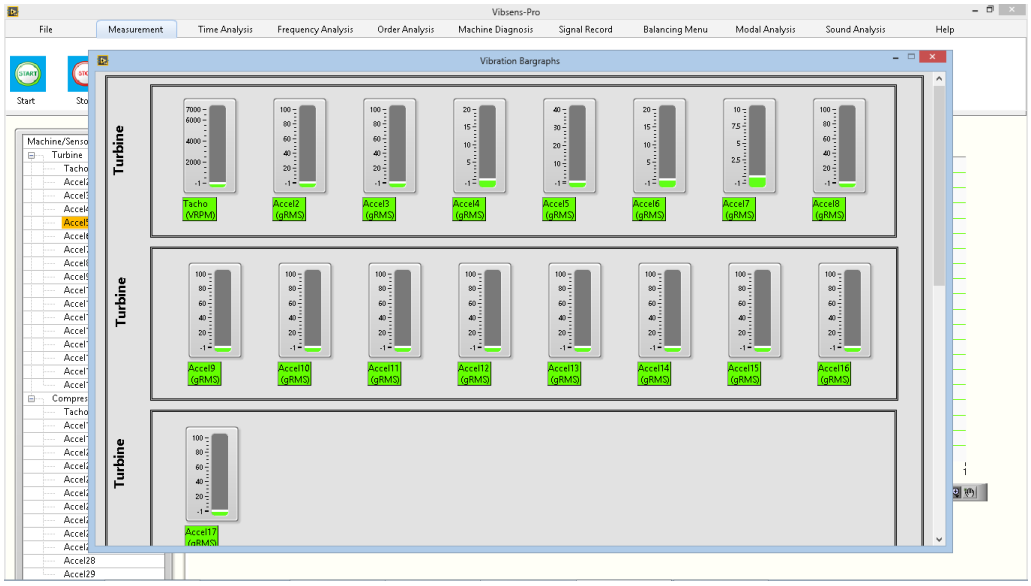
The trend plot is a rectangular plot on which the value of a measured parameter is plotted versus time. Trend plots can be used to display any kind of data versus time: Displacement, Velocity, Acceleration, gap voltage (radial or thrust position), rotor speed, and process variables, such as pressure, temperature, flow, or power.

Trend plots are used to detect changes in these important parameters. They are used for both long and short term monitoring of machinery in all types of service and are, typically, a kind of a steady state plot. Alarm values which are entered to the program by Report/ Vibration Standard menu, are shown in this graph as green, yellow, orange and red plots corresponding to New, Normal, Alarm and Danger zones, respectively.

Different vibration overall measurements i.e. RMS, Peak and Pk-Pk are shown in a table for every time frame which has been selected on Data Selector tab.



Trend Plot

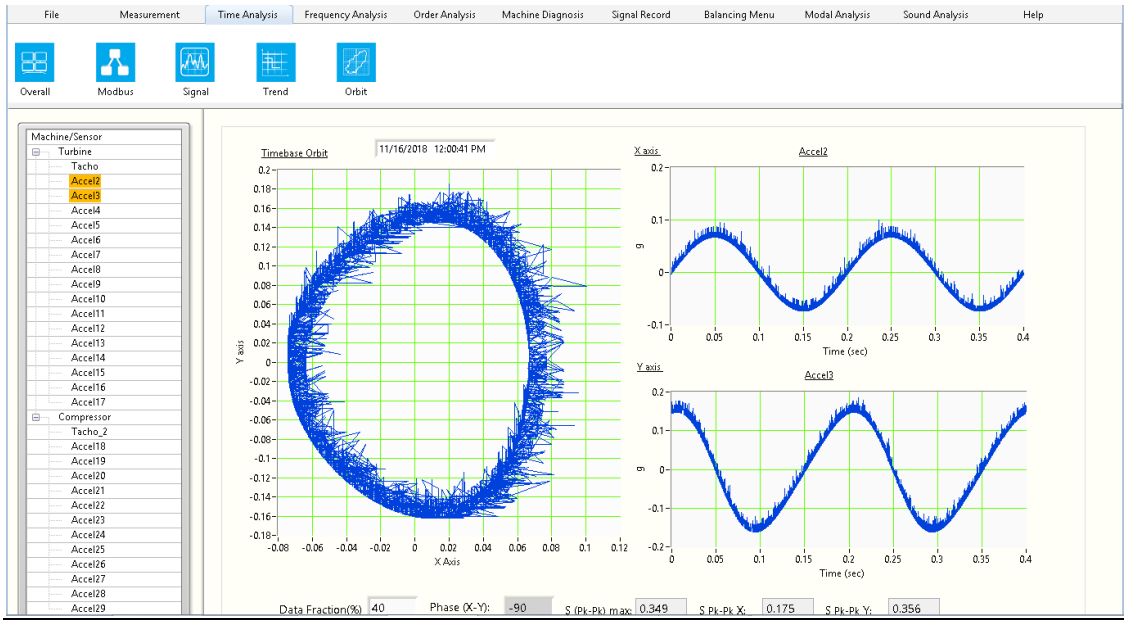


Barograph Page

Time base orbit

While the time waveform plot can provide important and useful information, it is inherently limited to one dimension of rotor motion. Since, in any lateral plane along the rotor, the rotor moves in a two-dimensional path, or orbit, this one-dimensional picture provided by a single transducer is not adequate. To measure this motion, a second transducer must be installed perpendicular to, and coplanar with, the first transducer. Only then will there be enough information to observe the complete motion of the rotor in that plane. This motion is presented on two separate time waveform plots and one two-dimensional dynamic motion plot called orbit plot. The orbit represents the path of the shaft centerline relative to a pair of orthogonal transducers. These transducers are usually mounted rigidly on the machine casing near a bearing; thus, the orbit typically represents the path of the shaft centerline relative to the bearing clearance of the machine. Because of its ease of interpretation and extensive information content, the orbit is probably the most powerful time domain plot format available to the machinery diagnostician. Orbit analysis is a tool used to detect failures like rubs, unbalance, misalignment or oil whip in journal bearing machines. There are two orbit plot types available: Time base and Order base orbit

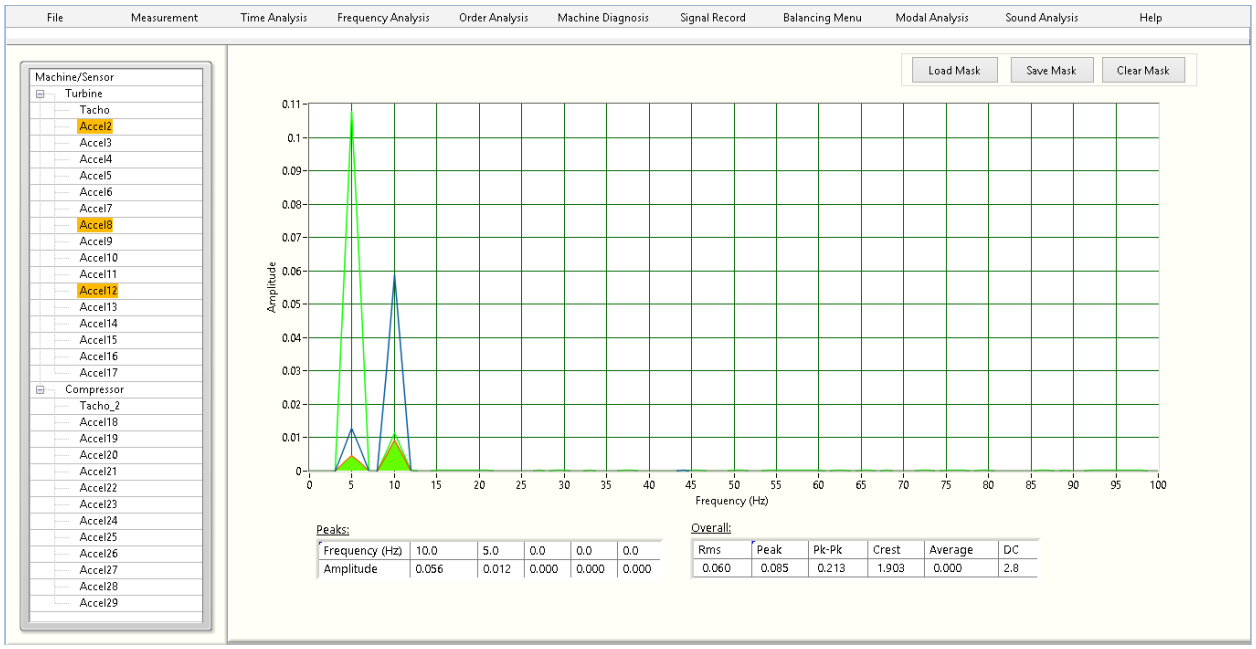
For time base you should have two perpendicular installed transducers, while on ordered orbit one needs a tachometer to be used for phase, speed and order measurements.



Orbit Plot Page

FFT Spectrum

Machines can vibrate at many different frequencies simultaneously. These frequencies can be related or unrelated to running speed and include both subsynchronous and supersynchronous frequencies. Since these frequencies are associated with the operating condition of the machine, the machinery diagnostician must have some way to determine the frequency content of a vibration signal in order to make an accurate diagnosis. Vibration frequencies sometimes appear as a series of harmonics. The series consists of the lowest frequency in the series, called the fundamental, and a number of frequencies at integer multiples of the fundamental. FFT (Fast Fourier Transfer) is used to seize out the frequency contents of a vibration signal. FFT window looks like the figure shown below.

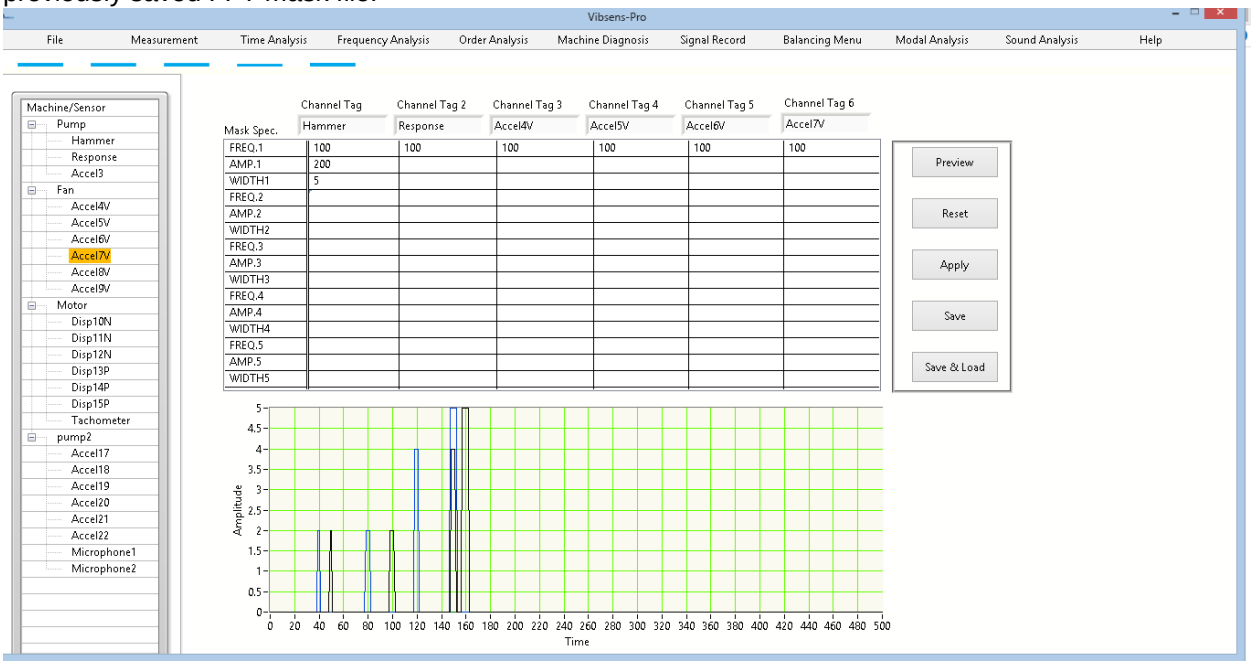


FFT Spectrum Page

On maximum amplitudes table, one may see the frequency & amplitude of maximum FFT points. One may change the plot type: RMS, Peak and Pk-Pk. Load mask & Save mask is used for comparing FFT plots between other time steps.

FFT Mask

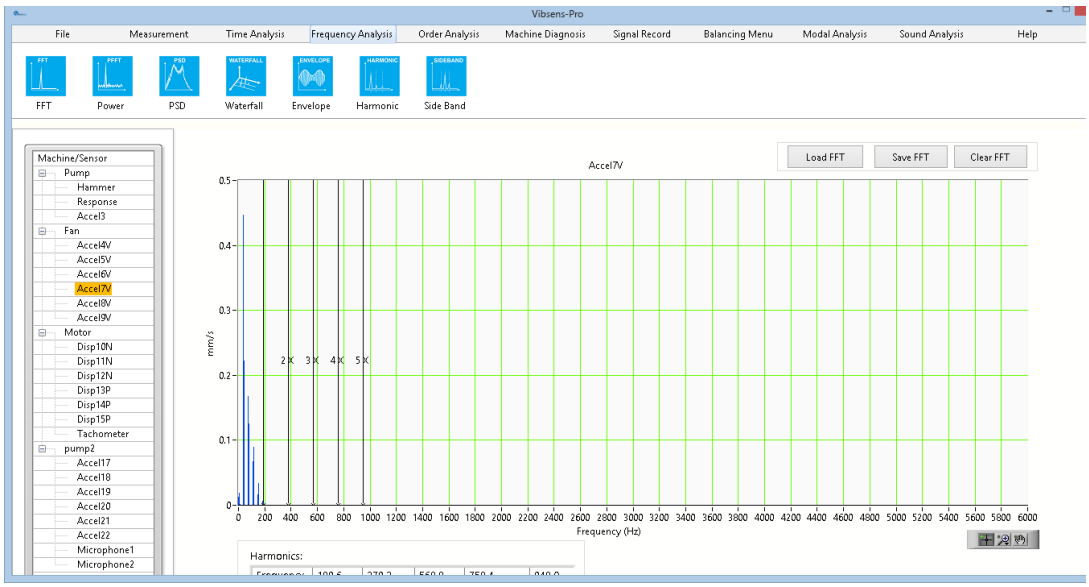
User can also create FFT masks from the healthy state of the machine and use it as a reference for comparison with the current state of the machine. For FFT amplitude comparison you need to load a previously saved FFT mask file.



FFT Mask Generation Page

Harmonic Analysis

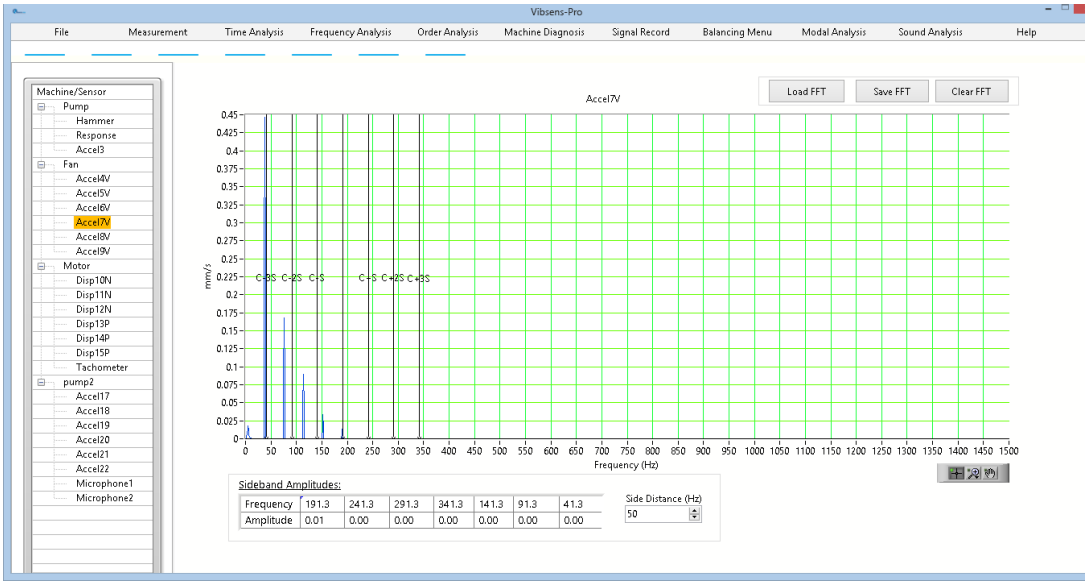
By clicking on harmonic analysis, one may perform harmonic analysis on the FFT loaded. Figure below shows it with an example loaded to the plot. The frequency which its amplitude and harmonics amplitudes are to be calculated should be entered in 1 X Freq. (Hz) and the program would seize out amplitude of harmonics and show them on a table.



Harmonic Analysis Page

Sideband Analysis

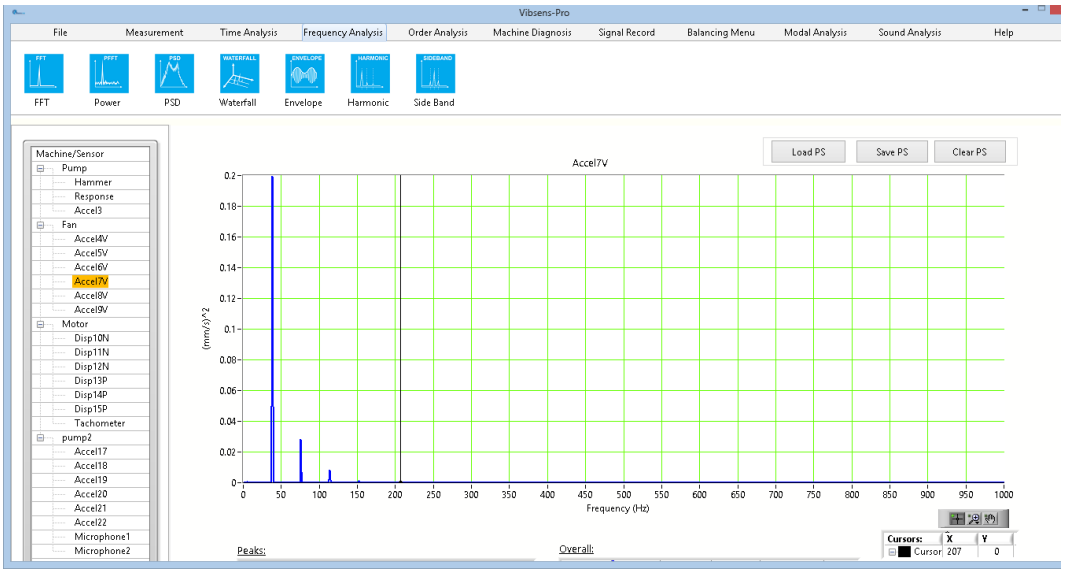
By selecting sideband analysis from frequency analysis menu, user would encounter a window such as below. In this window, one may enter the span (sideband) and center frequency and see their amplitudes and markers on the plot and table below it.



Sideband Analysis Page

Power Spectrum

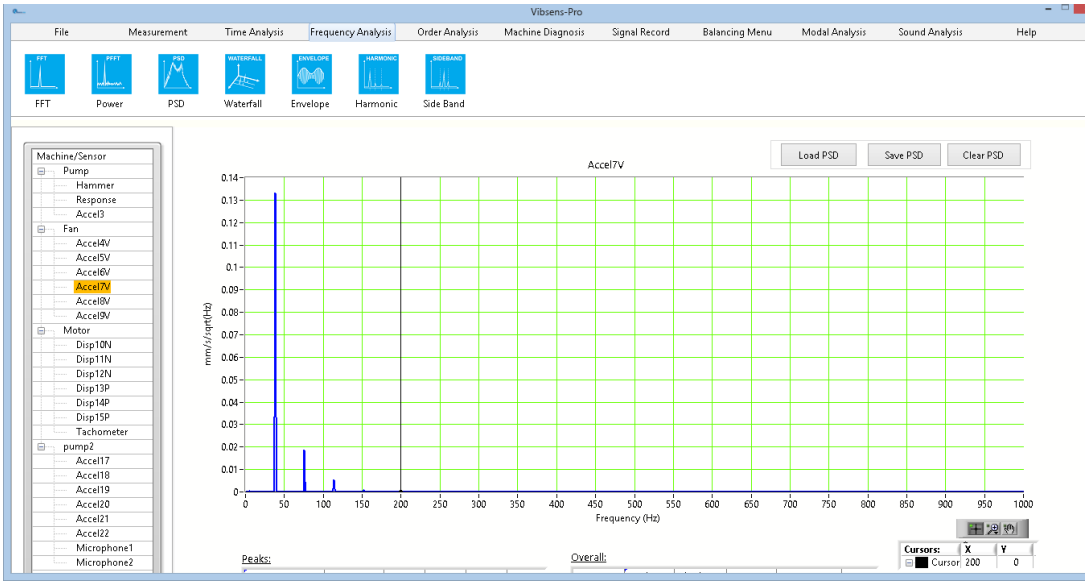
This window shows the Power spectrum of the time signal for the selected frame. Maximum amplitudes and overall values are shown in tables on the bottom of the window.



Power Spectrum Page

Power Spectral Density (PSD)

This window shows the PSD of the time signal for the selected frame. Maximum amplitudes and overall values are shown in tables on the bottom of the window.

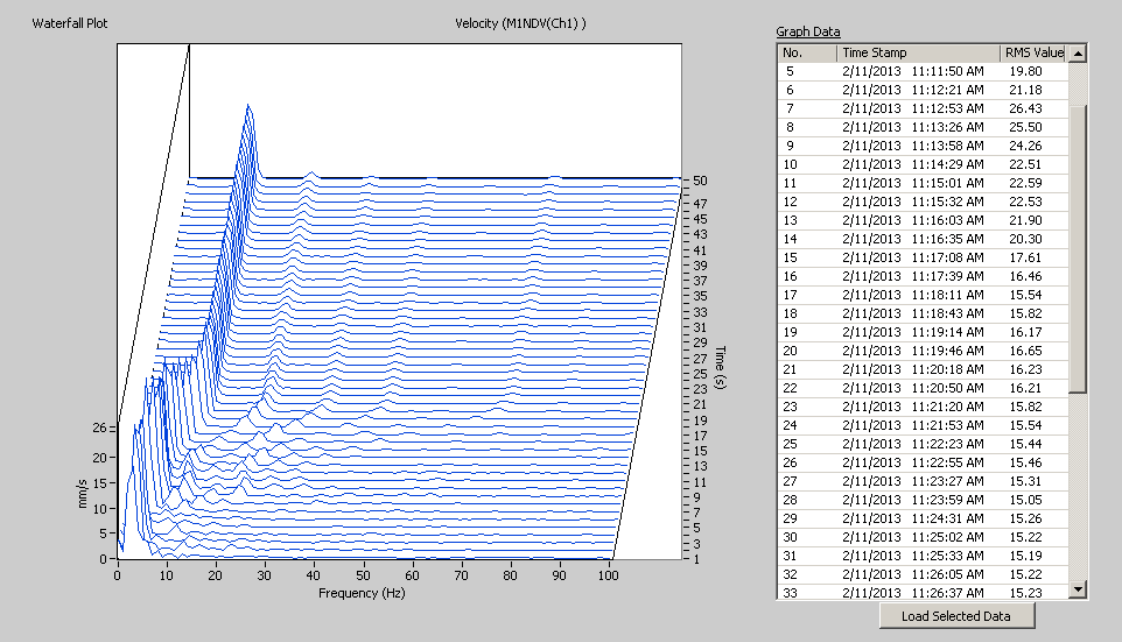


Power Spectrum Page

Waterfall Plot

Waterfall plots are designed to display multiple spectra (FFT spectrum) versus time, during run up, run down or constant speed operation. Waterfall plots are 3D plots with time, frequency and amplitude axis. Waterfall plots are commonly used to examine how machine vibration changes with

a change in an operating parameter. Waterfall plot clearly shows that the sub synchronous, super synchronous and asynchronous vibration amplitudes regards to 1X vibration and their changes versus time or speed changes. The table beside the waterfall plot shows the time of the spectrum and the overall RMS vibration of that frame. User may choose one of the frames by clicking on the frame number in the table and selecting “Load Selected Data” button.

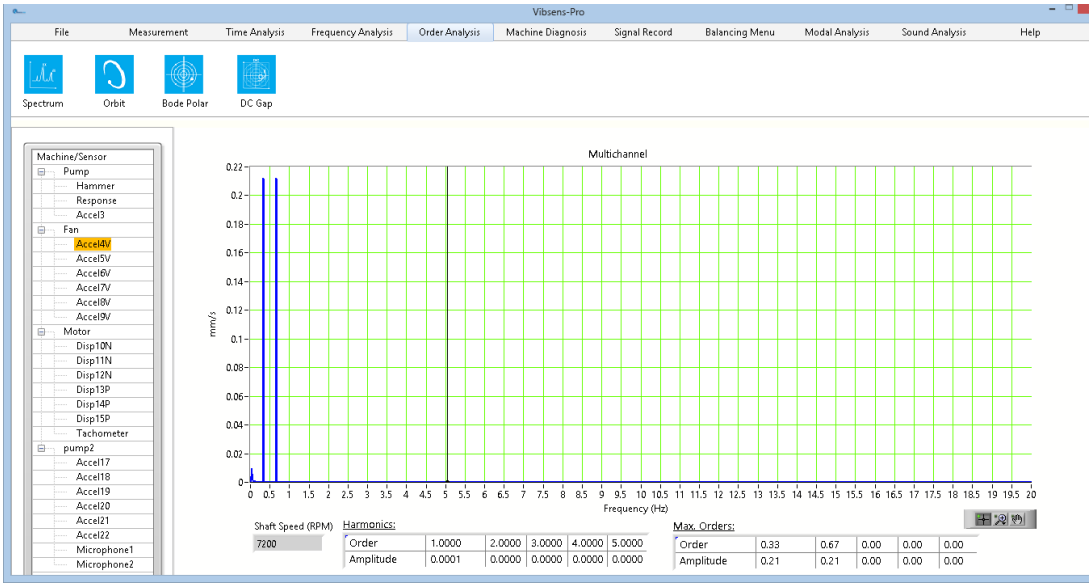


No.	Time Stamp	RMS Value
5	2/11/2013 11:11:50 AM	19.80
6	2/11/2013 11:12:21 AM	21.18
7	2/11/2013 11:12:53 AM	26.43
8	2/11/2013 11:13:26 AM	25.50
9	2/11/2013 11:13:58 AM	24.26
10	2/11/2013 11:14:29 AM	22.51
11	2/11/2013 11:15:01 AM	22.59
12	2/11/2013 11:15:32 AM	22.53
13	2/11/2013 11:16:03 AM	21.90
14	2/11/2013 11:16:35 AM	20.30
15	2/11/2013 11:17:08 AM	17.61
16	2/11/2013 11:17:39 AM	16.46
17	2/11/2013 11:18:11 AM	15.54
18	2/11/2013 11:18:43 AM	15.82
19	2/11/2013 11:19:14 AM	16.17
20	2/11/2013 11:19:46 AM	16.65
21	2/11/2013 11:20:18 AM	16.23
22	2/11/2013 11:20:50 AM	16.21
23	2/11/2013 11:21:20 AM	15.82
24	2/11/2013 11:21:53 AM	15.54
25	2/11/2013 11:22:23 AM	15.44
26	2/11/2013 11:22:55 AM	15.46
27	2/11/2013 11:23:27 AM	15.31
28	2/11/2013 11:23:59 AM	15.05
29	2/11/2013 11:24:31 AM	15.26
30	2/11/2013 11:25:02 AM	15.22
31	2/11/2013 11:25:33 AM	15.19
32	2/11/2013 11:26:05 AM	15.22
33	2/11/2013 11:26:37 AM	15.23

Waterfall Plot Page

Ordered spectrum

FFT loaded in the software can be used for order analysis in this window. To be able to use this function rotting speed of the shaft should be manually entered in Shaft speed section in Hz unit. A sample window is shown below. The table below the graph shows the maximum amplitude of different orders.



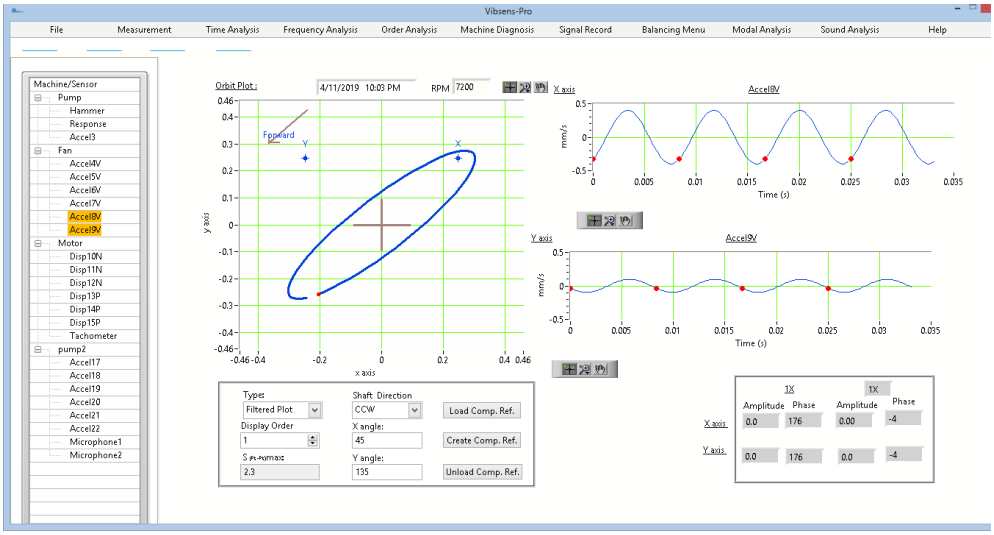
Harmonics: Order	1.0000	2.0000	3.0000	4.0000	5.0000
Amplitude	0.0001	0.0000	0.0000	0.0000	0.0000

Max. Orders: Order	0.33	0.67	0.00	0.00	0.00
Amplitude	0.21	0.21	0.00	0.00	0.00

Ordered Spectrum Page

Ordered Orbit

For the times when one likes to see the ordered orbit, this function is available. For this one needs a tachometer (KeyPhasor™) channel or manually enter the shaft speed. Other buttons are just like the Time base orbit. Sample of this window is shown below.



Ordered Orbit Page

Machine Diagnosis

Machine diagnosis menu contains a list of mostly used frequency calculators which are applied mostly in industry. It includes:

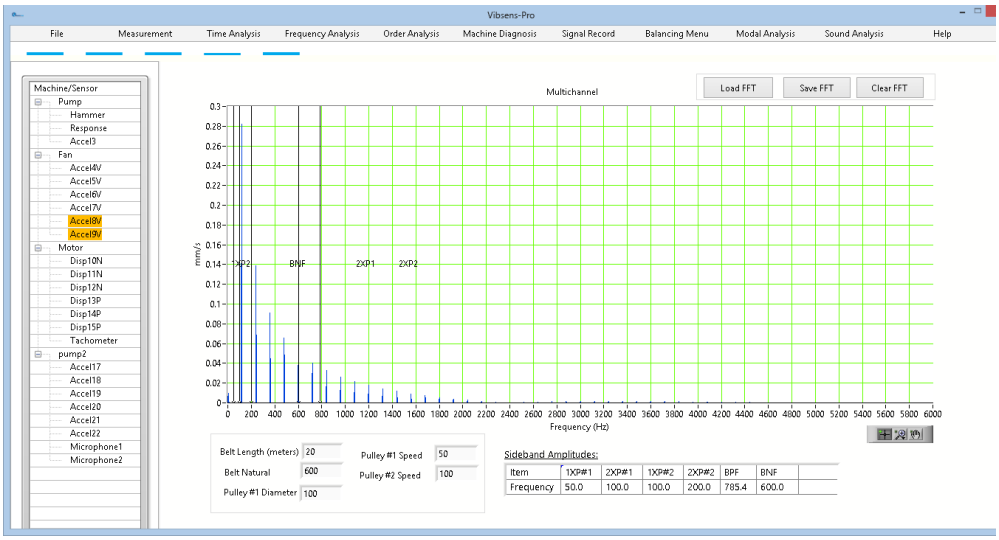
1) Belt driven machines
2) Anti-friction bearing frequency calculator
3) Electric motor frequency calculator
4) Gearbox frequency calculator

Belt Diagnostic

On this page one may enter main frequencies which are important for frequency analysis of belt driven machines and see their indicators on FFT plot and amplitudes on table results. Data which should be input to the program is as follows.

Rotational speed of the pulleys in hertz unit , Diameter of one pulley # 1 is entered in meter unit. Belt length should be input for the calculation of Belt pass frequency and the belt natural frequency is optional to input. These frequencies are indicated in the graph and tabulated in the bottom of the graph with their correspondent amplitudes.

1)1X of Pulley # 1 (1XP1)
2) 2X of Pulley # 2 (2XP1)
3) 1X of Pulley # 2 (1XP2)
4) 2X of Pulley # 2 (2XP2)
5) Belt Pass Frequency (BPF)
6) Belt Natural Frequency (BNF)



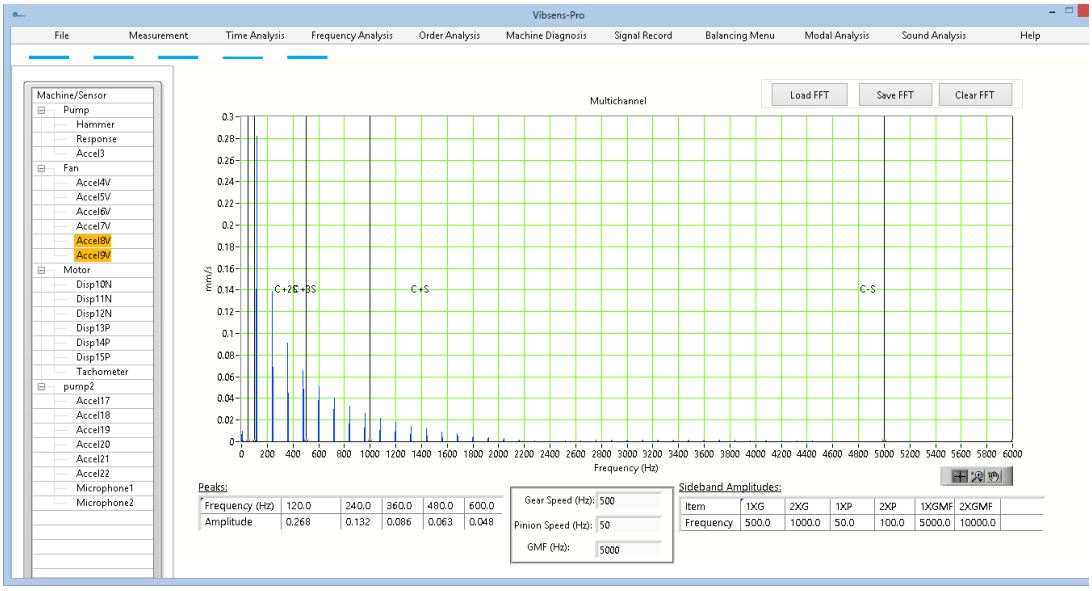
Belt Diagnostic Page

Gearbox Diagnostic

On this page one may enter main frequencies which are important for frequency analysis of gear driven machines and see their indicators on FFT plot and amplitudes on table results. Data which should be input to the program is as follows.

Rotational speed of the pinion and gear in hertz unit, Gear mesh frequency which is the product of pinion speed and its number of teeth or the same about gear. These frequencies are indicated in the graph and tabulated in the bottom of the graph with their correspondent amplitudes.

1)1X of pinion (1 X P)
2) 2X of pinion (2 X P)
3) 1X of gear (1 X G)
4) 2X of gear (2 X G)
5) 1X of gear mesh frequency (GMF)
6) 2X of gear mesh frequency (2XGMF)



Gearbox Diagnostic Page

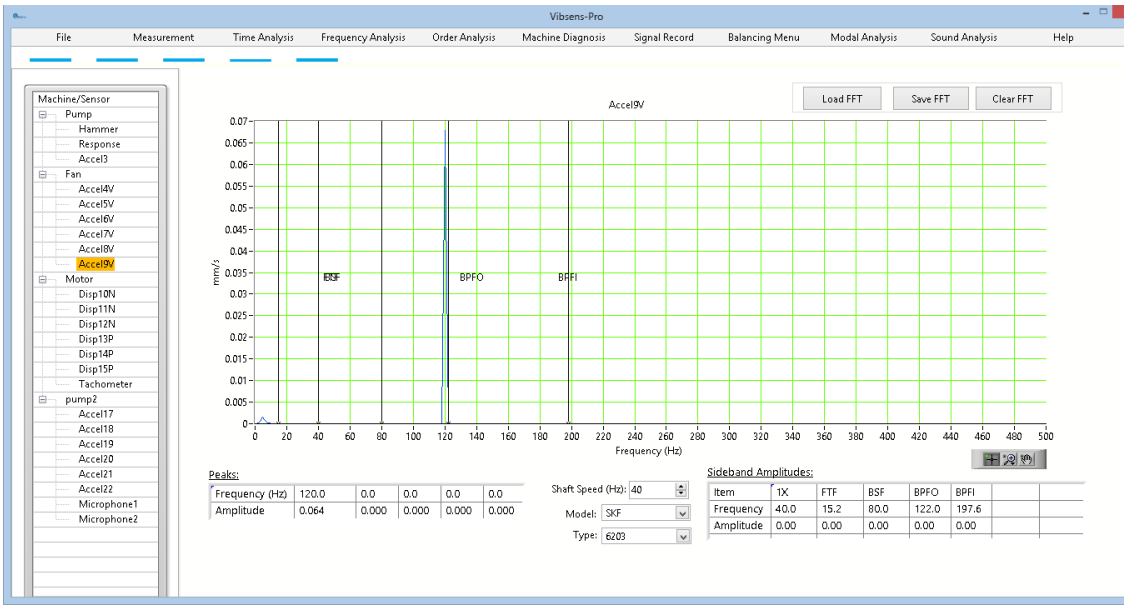
Bearing Diagnostic

On this page one may enter main frequencies which are important for frequency analysis of anti-friction bearings and see their indicators on FFT plot and amplitudes on table results. Data which should be input to the program is in 2 ways. First you may enter the geometric dimensions of the bearing and press the calculate button. Second way is to choose brand & model of the bearing type and clicking on load bearing button. For both ways one should input the shaft speed in hertz unit. For manually inputting the bearing data, these parameters should be defined:

1) Shaft speed (Hz)
2) Pitch Diameter (mm)
3) Roller Diameter (mm)
4) Contact Angle (degrees)
5) Number of Rollers

If you know the type of your bearing, you may choose it from Model and Brand sections. Pressing Load Bearing/Calculate button would indicate the following frequencies:

1) Rotational speed of the shaft (1X)
2) Outer race bearing frequency (BPFO)
3) Inner race bearing frequency (BPFI)
4) Fundamental train frequency (FTF)
5) Ball spin frequency (BSF)



Bearing Diagnostic Page

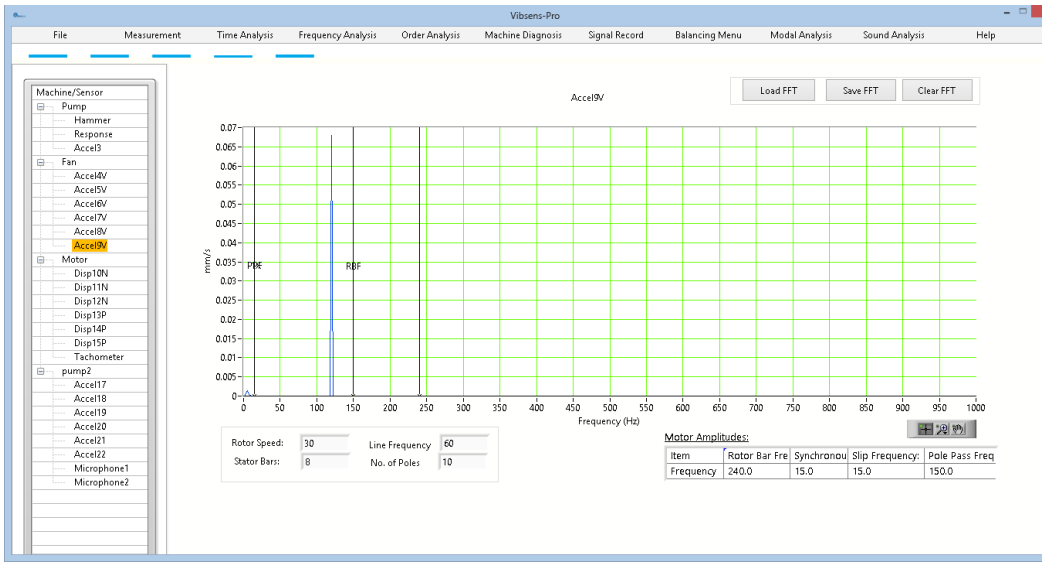
Electric Motor Diagnostic

On this page one may enter main frequencies which are important for frequency analysis of electric motors and see their indicators on FFT plot and amplitudes on table results. Data which should be input to the program is as follows.

1) Motor speed (Hz)
2) Line Frequency (Hz)
3) Number of stator bars
4) Number of rotor poles

Program would calculate the following frequencies and show their amplitudes in the table.

1) Synchronous speed (1X)
2) Slip frequency (SF)
3) Pole pass frequency (PPF)
4) Rotor bar frequency (RBF)

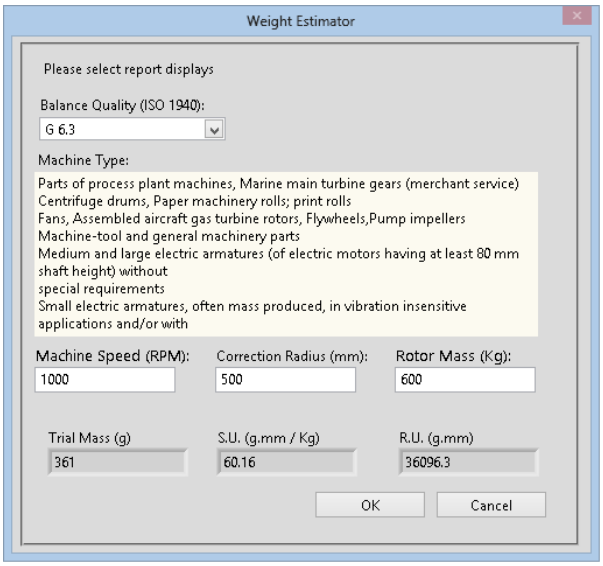


Electro motor Diagnostic Page

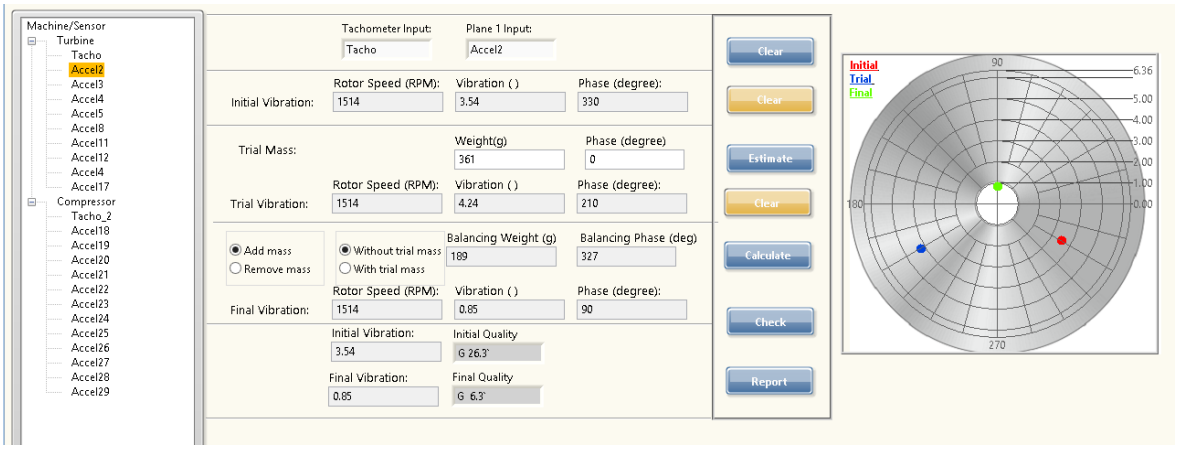
Single Plane Balancing Application:

VibSens-Pro® has developed a new interface for single plane balancing application. User can select from all the available input channels the signals for phase measurement and vibration measurement. It contains a trial weight estimator which enables the user to input the shaft specification consisting form rotor weight, balancing diameter, machine speed and desired balancing grade based on ISO 1940.

Moreover, it enables the user to see the initial, trial & final vibration data all on a single polar plot. It has features for various balancing mass either mass removal or mass addition and even keeping the trial mass if it is useful. Final and initial vibrations are converted to balancing grade and a balancing report is generated which includes all the measurement data including optional time signal and spectrum. Report template and setup can be edited by the user in a way to comply with its requirements and is quite easy to modify by a little Excel® work around.



Weight Estimator Page



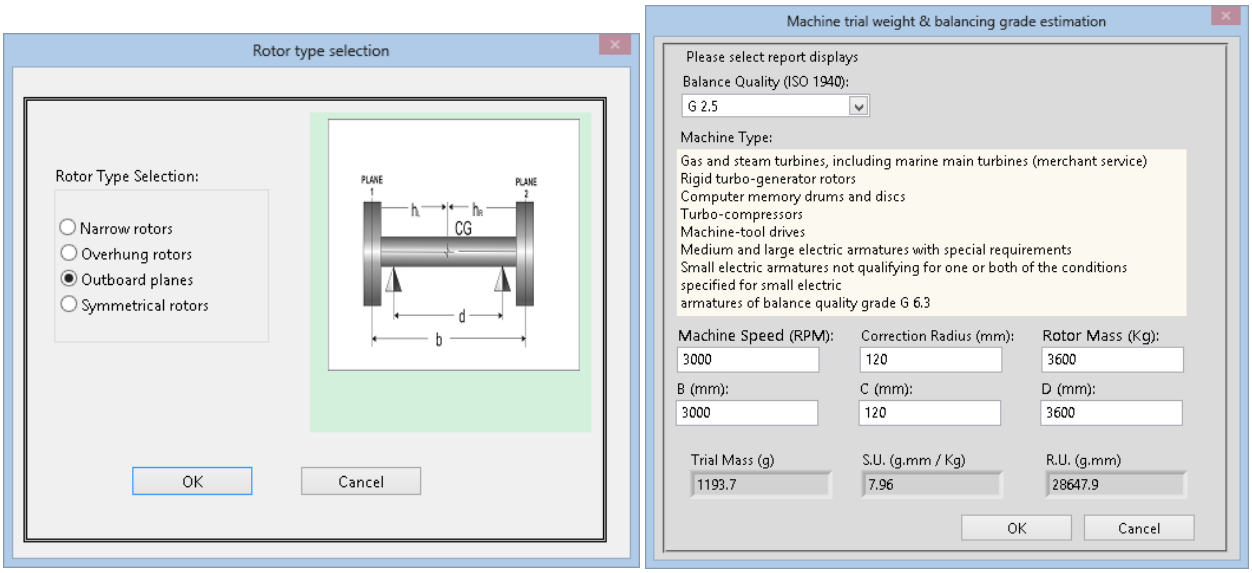
One Plane Balance Page

Two plane balancing application

Vibsens-Pro® is provided with a software package dedicated for in situ two plane balancing. User starts the balancing process by selecting the phase and plane 1 & 2 input signals from the tree on the left tab of the page, then the software automatically starts to measure and indicate vibration phase and amplitude of both input signals.

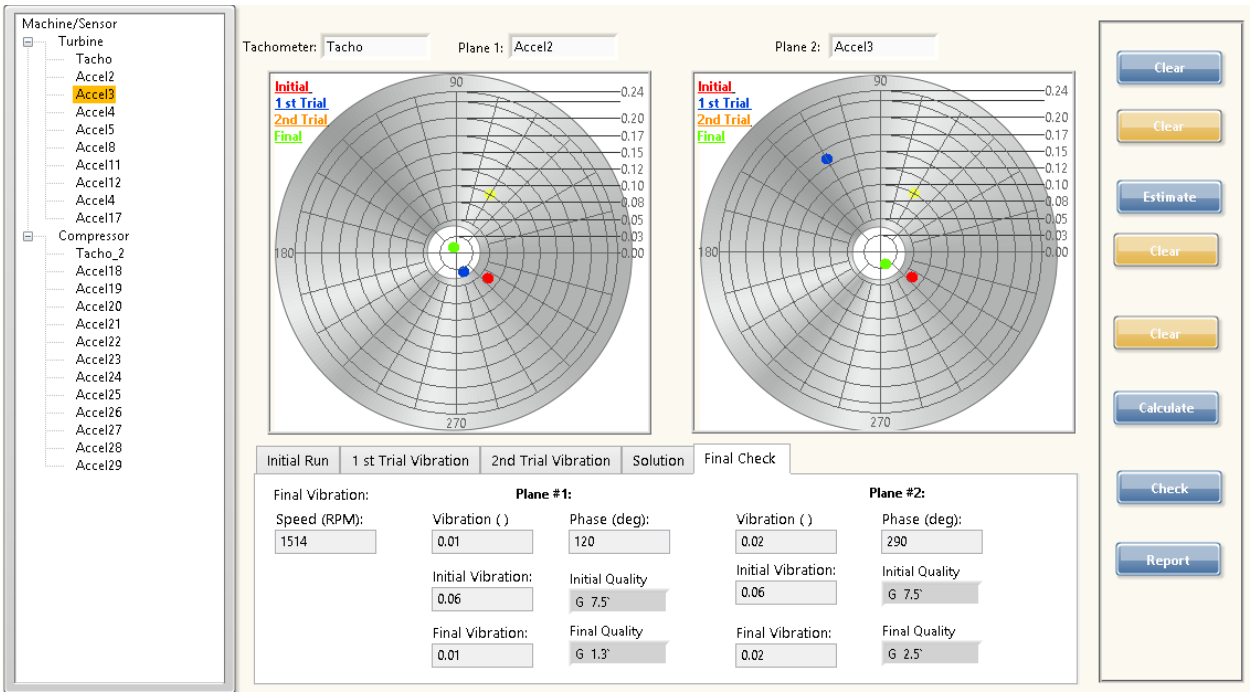
After accepting the initial vibration status of rotor, user can input the input rotating system dimensions to calculate the balancing grade based on ISO 1940 required for the machine based on measured vibration data and it would suggest trial weights for the system. Two trial runs with trial weights are employed to calculate the influence coefficient matrix of the system and calculation of balancing masses for both planes based on the user choice either mass removal or mass addition and with or without trial weights removal.

User can see all the data from all runs initial, trial 1, trial 2 and final on two polar plot each for one input signal and related to a balancing plane.



Rotor Type Selection & Grade Estimation Pages

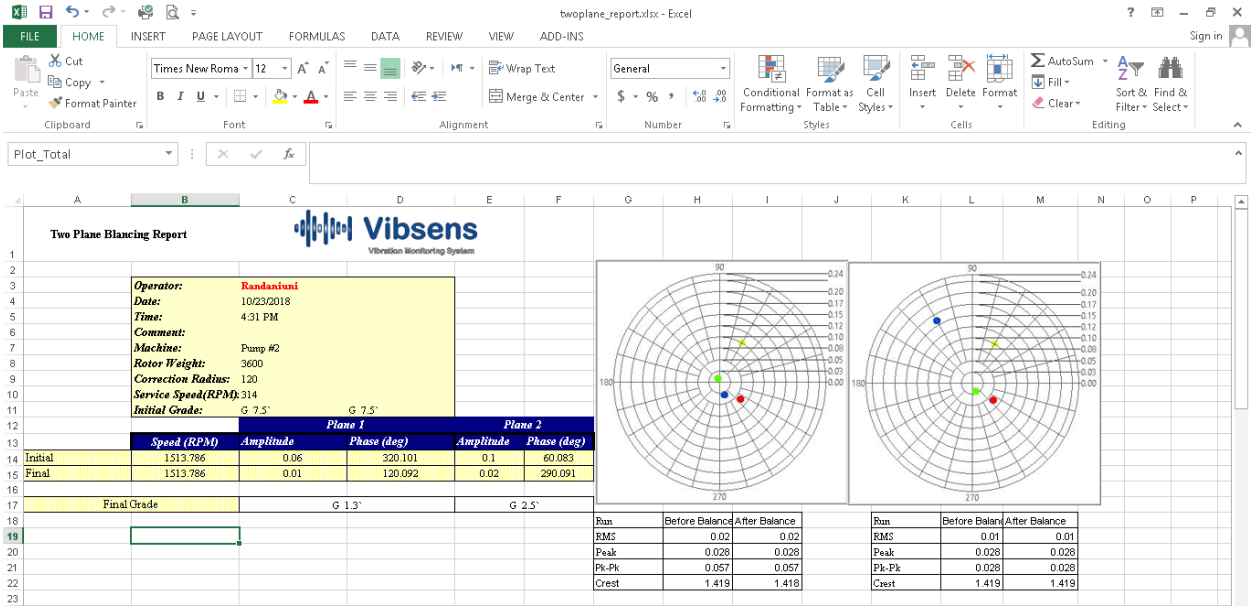
Finally user can set up desired report containing not only the final and initial vibrations but also time signal and spectrum plots. Report template and setup can be edited by the user in a way to comply with its requirements and is quite easy to modify by a little Excel® work around.



Two plane balancing applicationPage

Excel Report

By selecting this option a form is shown to the user, and the user may fill its records and select the graph types which he likes the report to include and then click on OK button.



Two Plane Balancing Report

Operator:	Randaniuni
Date:	10/23/2018
Time:	4:31 PM
Comment:	
Machine:	Pump #2
Rotor Weight:	3600
Correction Radius:	120
Service Speed(RPM):	314
Initial Grade:	G 7.5` G 7.5`

		Plane 1		Plane 2	
	Speed (RPM)	Amplitude	Phase (deg)	Amplitude	Phase (deg)
Initial	1513.786	0.06	320.101	0.1	60.083
Final	1513.786	0.01	120.092	0.02	290.091
Final Grade		G 1.3`		G 2.5`	

Run	Before Balance	After Balance
RMS	0.02	0.02
Peak	0.028	0.028
Pk-Pk	0.057	0.057
Crest	1.419	1.418

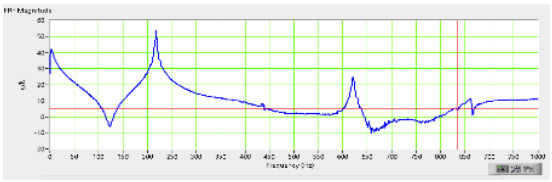
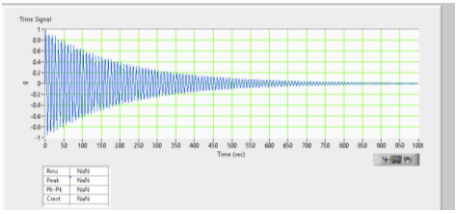
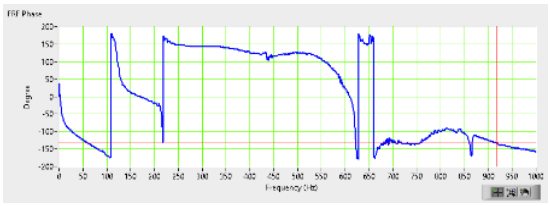
Run	Before Balan	After Balance
RMS	0.01	0.01
Peak	0.028	0.028
Pk-Pk	0.028	0.028
Crest	1.419	1.419

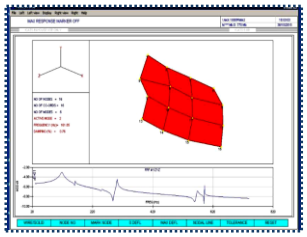
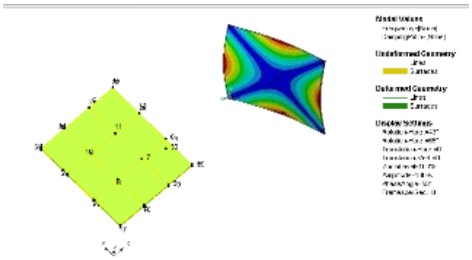
Report Sample in Excel Format

Modal analysis

Modal testing software is a menu of Vibsens-Pro® which has been developed for the measurement & recording of frequency response functions from transducers/ sensors; it can be used for machine dynamic response analysis, modal analysis, mode shape extraction and model updating. Moreover, it records frequency response functions needed by modal analysis software like ICATS™, ARTEMIS™ or other modal analysis packages for off-line data review and analysis. It contains mostly used functions to provide engineers with a collection of the most beneficial tools like magnitude, phase, real & imaginary FRFs. impact modal testing software connects to Vibsens vibration measurement modules and performs measurements & recordings. It contains magnitude, phase, real, imaginary and Nyquist plots. By this software package user is able to measure natural frequency and damping ratio of structures and also use its output file for mode shape plotting. It uses first channel of VA-2000 as trigger input to be connected to modal hammer and acquires waveform data. Analysis functions of modal software are as follows:

1) Triggered time data
2) Frequency response function (Real, Imaginary, Phase & Amplitude)
3) Frequency spectrum (FFT)
4) Power spectrum
5) Narrow band Nyquist plot
6) Coherence function
7) Data export for Eigen value (natural frequency) & Eigen vector (mode shape) extraction in 3rd party software

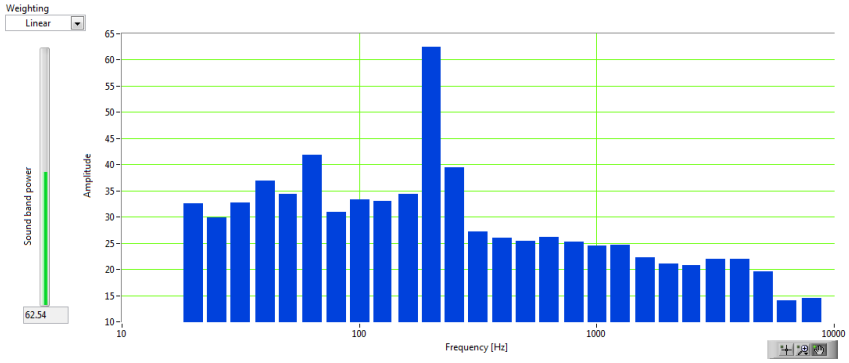




Acoustics Analysis

Vibsens-Pro Sound option is an application developed to analyze sound files recorded by VA-2000 measurement system. Acoustic analysis such as frequency spectrum, sound harshness, loudness, roughness analysis is performed in this software. Octave band analysis and sound level measurement is also included in the software.

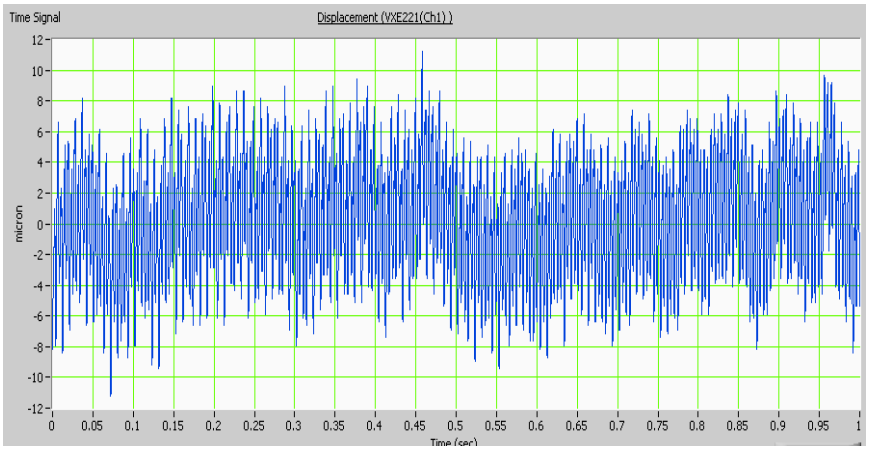
One of the key parts in today's world in design of machinery is about noise and acoustics emission. One of the things customers care in selection of a product is how much noise it makes. So manufacturers are paying more & more attention to the sound of their products nowadays. For a thorough study on how to decrease noise of a product, one needs a sound analyzer. VA-2000 is a cost effective and comprehensive solution for sound analysis. Another application of sound analysis is as a technique for damage detection and to compare intensity and frequency content of sound of an old machine with a healthy new one.

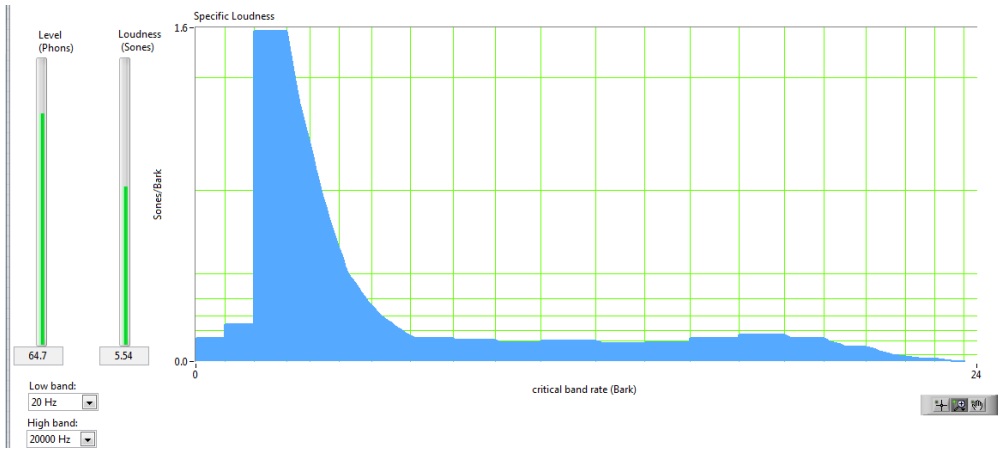


There has been standards & guidelines published for the evaluation and analysis of acoustics emission of a machine. VA-2000 has features for this job and moreover, it can export signals in WAV file format for further analysis in other 3rd party software.

It can take up to 24 microphones for analysis with 12 KHZ sampling frequency, of course in many applications it is not needed and if number of microphones used as input is limited to three, it enables the user to perform the analysis with 40 KHz which contains all the audio bandwidth of human ear.

- Some of the functions for sound analysis is as follows:
- Time signal and frequency spectrum
- Determination of sound parameters such as loudness, harshness & roughness according to ISO532B / DIN 45631





NVH acceptance tests for special parts & rotary machines

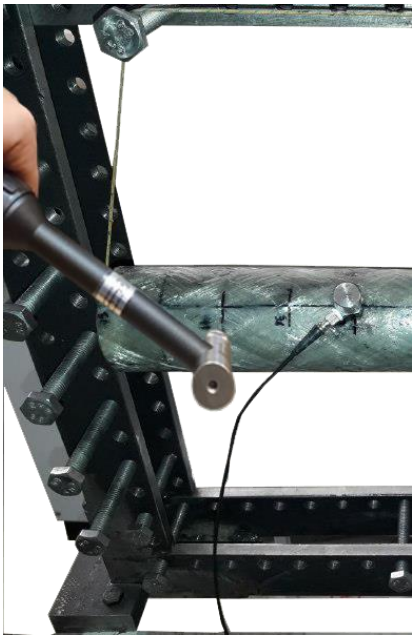
Many standards & guidelines have been developed for FAT (field acceptance test) and SAT (site acceptance test) of rotating machinery like ISO 10816, ISO 7919 etc. which forces the manufacturers of rotary machines to have a sound & vibration test lab to be able to test and verify their products at the end of the production line and as a quality check procedure.

These manufacturers based on their product need a sophisticated lab to be equipped with sensors and measurement required for performing these validation tests. VibSens VA-2000 can be readily applied in this field. An example is discussed in the following. Manufacturers of the following products all fall in this category.

VIBRATION SEVERITY PER ISO 10816

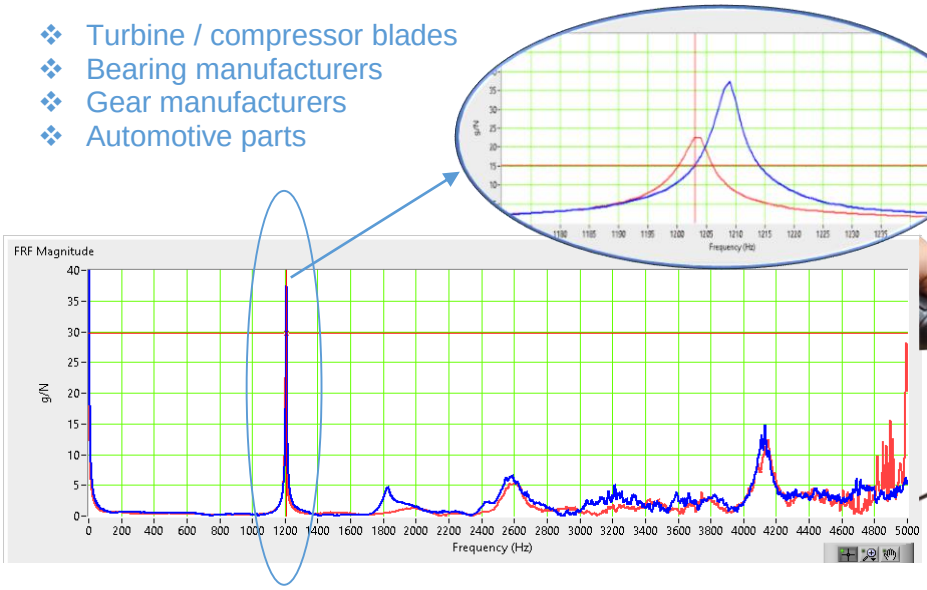
Machine		Class I small machines	Class II medium machines	Class III large rigid foundation	Class III large soft foundation
in/s	mm/s				
Vibration Velocity Vrms					
0.01	0.28				
0.02	0.45				
0.03	0.71		good		
0.04	1.12				
0.07	1.80				
0.11	2.80		satisfactory		
0.18	4.50				
0.28	7.10		unsatisfactory		
0.44	11.2				
0.70	18.0				
0.71	28.0		unacceptable		
1.10	45.0				

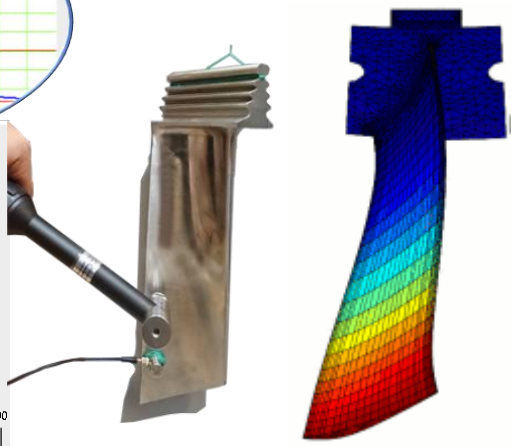
- Pumps
- Compressors
- Gearboxes
- Turbines
- Electrical motors



Natural frequency of solid structures is a function of geometry & material specs. One of the growing uses of frequency analysis and natural frequency tests is as an end of production line quality control test. Products are excited by modal exciters and the natural frequency of the product under test is compared to the natural frequency of the proof product. Vibration test rig is developed for comparison of parts manufactured with a proof sample as a QC planning at the final stage. Difference more than a determined value in frequency measured from the response upper or lower than one of the interested natural frequencies in the interested range could show some geometric or material inconsistency and lead to the rejection of the product.
This application is much useful for the companies which produce the following parts:

- Turbine / compressor blades
- Bearing manufacturers
- Gear manufacturers
- Automotive parts





Network Switches

When multiple SETPOINT racks are interconnected as part of a single CMS installation, each rack is configured with a unique IP Address and connected via a switch to a common network backbone.

Vibsens-Pro® minimum computer requirements:

• 2.2 GHz multi-core 32/64 bit processor

• 4 GB of system memory

• At least 200 GB of available hard disk space, preferably on a dedicated hard disk drive

• Optimal display on 1366 * 768 high color (32-bit) display

• Gigabit Ethernet network interface adapter (card)

Vibsens-Pro® software requirements:

• Microsoft® Windows 7, 8, 8.1, 10, XP (32-bit or 64-bit)

• Microsoft® .NET Framework 4.5 or later

• Microsoft® Office 2007 or later

Order Information:

On line Vibsens-Pro®				
VibsenePro	**-BX**	**-MX**	**-SC**	**-OMDS**
	X: Balance Toolkit 0: No Balance Toolkit 1: Active One/Two Plane Balance Toolkit	X: Modal Test Toolkit 0: No Modal Test Toolkit 1: Active Modal Test Toolkit	S: Server C: Client Display SC: Server/Client Display	Offline Machine Diagnostic Software

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