

User Manual

VibAnalyser5000 Online Monitoring Software

Last change: 12 December 2017

v1.0

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1. Overview

1.1. System Introduction

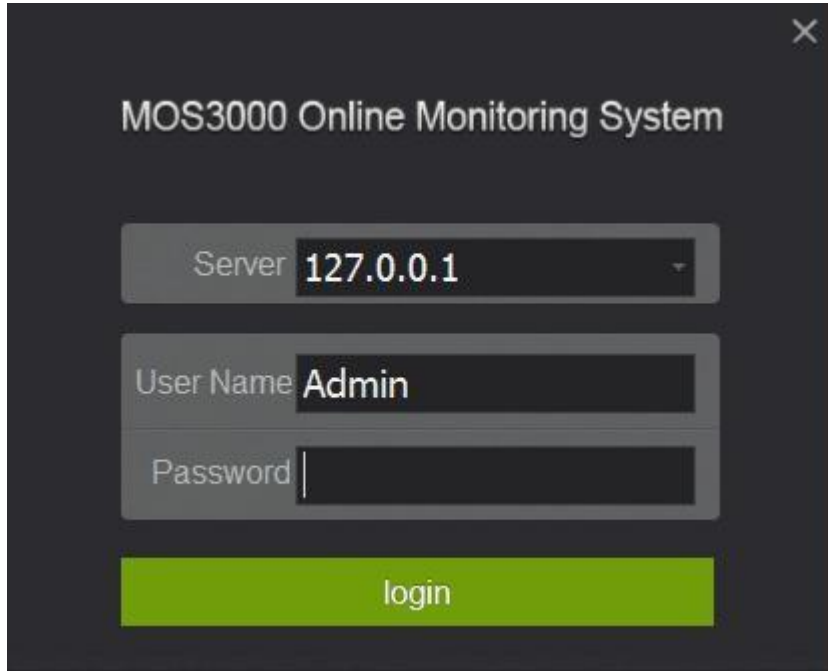
VibAnalyser5000 Online Monitoring Software is B/S software specialized for PCE Instruments condition monitoring products. After the server installation the clients can use the VibAnalyser5000 via browser. The system adopts SQL Server database. If the software is upgraded to PCE Instruments other products, the data is still compatible.

The system comes with the following features:

- 1) Flexible data storage methods: online collected data can be stored in the same database of the configuration information; users also can configure multi-database servers for online historical data storage to reduce the server load.
- 2) User rights management, users can add, edit the online collection station, configure the relevant measuring points, and set the automatic data collection time interval and data storage strategy of every collection station.
- 3) Upload the collected data automatically through the network.
- 4) Supports manual collection (collected data can be saved to the corresponding measurement points).
- 5) Plenty of data analysis functions:
 - Time domain waveform, spectrum, multi-waveform, multi-spectrum, long waveform, speed data
 - Trend, multi-trend, sampling value trend, long waveform trend, waterfall
 - Envelope demodulation, cepstrum
 - Cross phase

1.2. System Login

Double click “VibAnalyser5000 online system” Icon on the desktop, and then get the following login interface, input Server IP (such as “127.0.0.1”), user name (default as “Admin”), password is blank; Click Login.



MOS3000 Online Monitoring System

Server 127.0.0.1

User Name Admin

Password

login

2. System Configuration

The Configuration tree is the basic parameter of the system, used for adding an organization, equipment, and measuring points. The nodes have four types: organization, equipment, measuring point, and DAQ definition. Users can add an organization under organization, measuring point under equipment, DAQ definition under dynamic measuring point.

The Online monitoring software has to be configured before operation.

2.1. New Organization

In the left navigation area of VibAnalyser5000 main page, users can switch the function.

Click drop-down box, and choose “System Configuration”, to open the system configuration main page.

Click on the “+” to create a new “Organization”, and input the organization name.

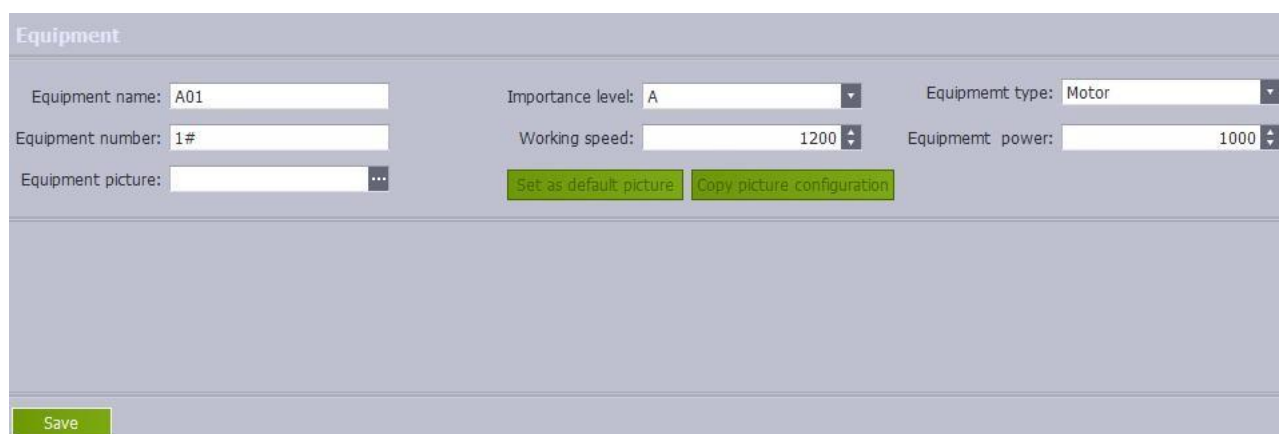
in the right-side. Click “Save” in the bottom. A new organization is created.



You can change the organization name, contact person, telephone number, etc.

2.2. New Equipment

The method is similar with that of creating new organization. Select the target organization node, right-click and select “New” in the popup menu to new equipment, input the equipment name in the equipment information on the right side, click “Save” to finish.



The image shows a web-based form titled "Equipment". It contains several input fields and buttons. The fields are: "Equipment name:" with the value "A01", "Importance level:" with a dropdown menu showing "A", "Equipment type:" with a dropdown menu showing "Motor", "Equipment number:" with the value "1#", "Working speed:" with a dropdown menu showing "1200", and "Equipment power:" with a dropdown menu showing "1000". There is also an "Equipment picture:" field with a small image icon and a "..." button. Below the picture field are two green buttons: "Set as default picture" and "Copy picture configuration". At the bottom left of the form is a green "Save" button.

The equipment information includes equipment name, importance level, type, equipment number, working speed, equipment power, picture, etc. Users can add equipment picture under this equipment node and mark the measuring point location in the picture. (This step shall be done after measuring points have been created). Users can have an idea about the equipment even without the need to go on-site.

Click “Add” under existing equipment information, it will display two sub-menus: choose from picture gallery and choose from local. Choose the equipment picture needed. It will be displayed in the equipment picture area. Click “Delete” and the equipment picture added will be deleted.

Users can add more than one equipment pictures, by choosing from the equipment picture drop-down box. Click “Set as default picture”, the chosen picture will be the default display every time you open the equipment.

Equipment Pictures Configuration: Click “copy picture configuration”, the current equipment picture will be applied to all equipment.

Add to picture gallery: click “Add to picture gallery”, current equipment picture will be added to the picture gallery.

2.3. New Measuring Points

When using VMS504, user can create the following measuring points: Dynamic DAQ point, Speed DAQ point, Process information DAQ point.

2.3.1. Dynamic Measuring Point

VMS504 supports vibration measurement and sway measurement, one set VMS504 can have 16 vibration DAQ points and 4 sway DAQ points. In VibAnalyser5000, vibration and

sway value belong to dynamic value. So, the step of creating sway measuring points and DAQ definitions are same as that of creating vibration measuring points and DAQ definitions.

Select the target equipment node, right click and select “New” in the pop-up menu to create new measuring point. The available measuring point types are dynamic, process information, speed. Choose dynamic measuring point, input the measuring point location and direction in the equipment information on the right side, click “Save” to finish. User can name the new dynamic measuring points as “Vibration one”, “Sway one” and so on. User can use the same way to create the left DAQ points, or use “Copy” and “Paste” tools to make a fast configuration.





Dynamic_Measure

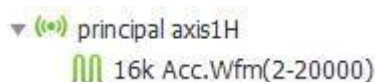
Measuring point position: Measuring direction:

The dynamic information includes the following:

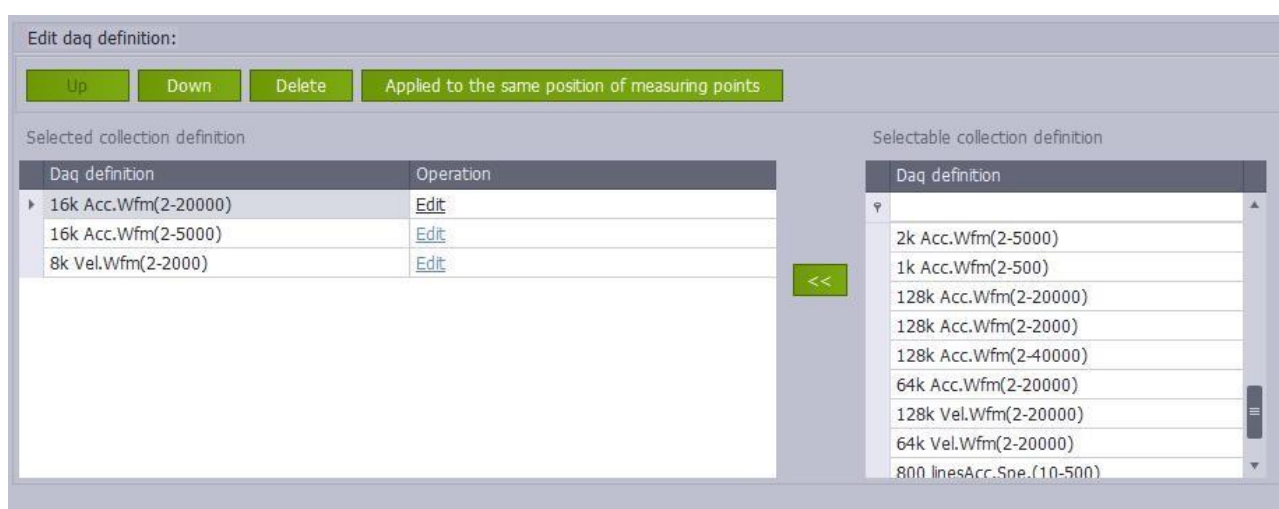
- 1). Measuring point position: according to the international standard, name the points under the equipment in turn 1, 2, 3....
- 2) Measuring point direction: every measuring point position usually includes horizontal, vertical and axial measuring points; marked by H, V, A. The measuring point position and the measuring point direction make the measuring point name, like 1H. It means the horizontal direction of first measuring point.

2.3.2. New Dynamic DAQ Definition

The new dynamic measuring point has a defaulted DAQ definition, such as the following photo (a). Click the Measuring point, user can set DAQ definitions for this point. Such as photo (b), click  will add the DAQ definition on the right to left, and click  will delete the DAQ definition on the left.



(a)



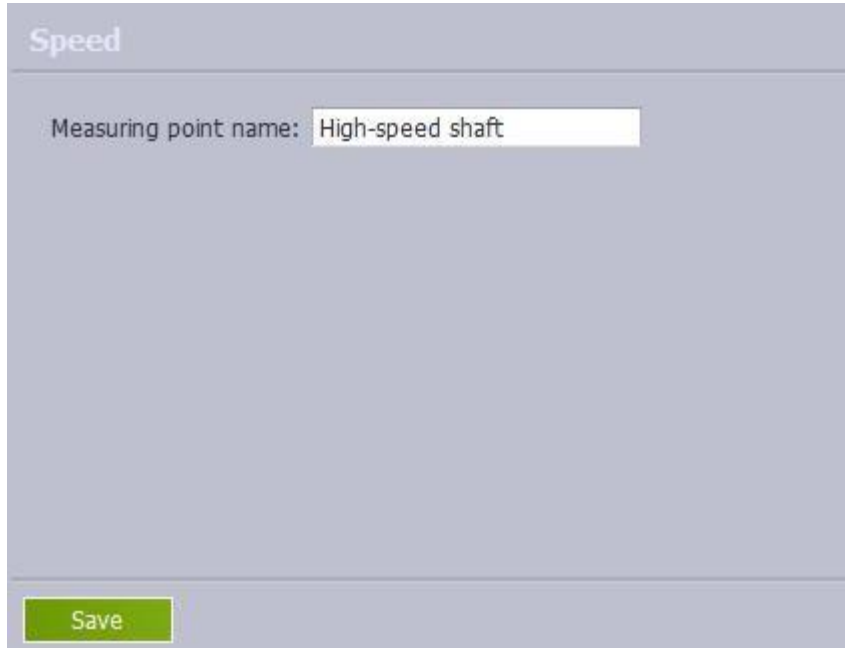
(b)

If the required DAQ definition cannot be found on the left, user can create it with “DAQ definition group”, please refer to “2.4 DAQ definition configuration”.

2.3.3. New Speed DAQ Point

VMS504 has two channels Speed DAQ points.

Choose the target equipment node to create measuring point, right click and choose “New” - “measuring point” - “RPM Measure” in the pop-up menu. Input the measuring point name. Click “Save” to finish the creation of the speed measuring point.

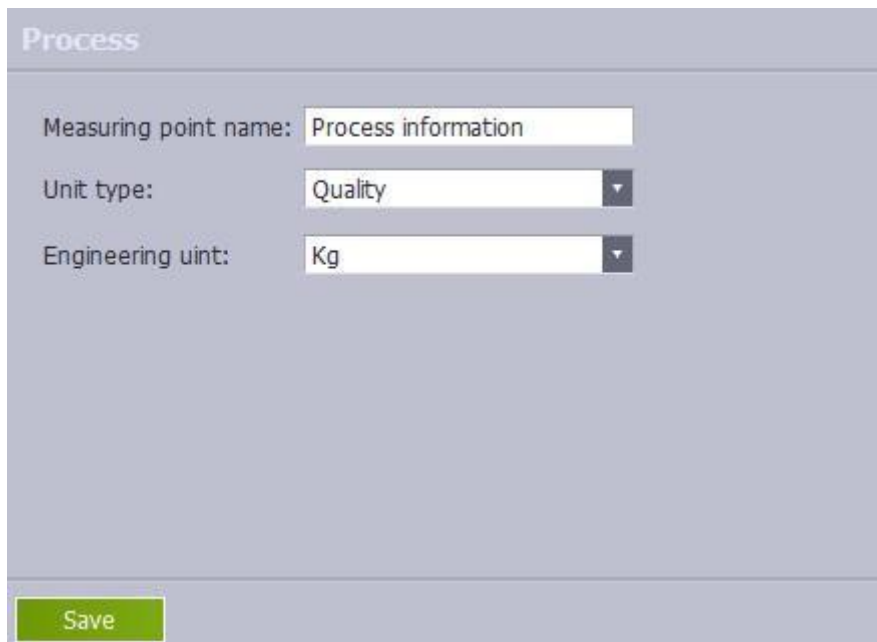


Speed

Measuring point name:

2.3.4. New Process Information DAQ Point

VMS504 has four channels Process information. It can be used to collect Power, Wind speed data and so on. Choose the target equipment node to create measuring point, right click and choose “New” - “measuring point” - “Process information Measure” in the pop-up menu. Input the measuring point name, unit type, engineer unit in the right side. Click “Save” to finish the creation of the process information measuring point.



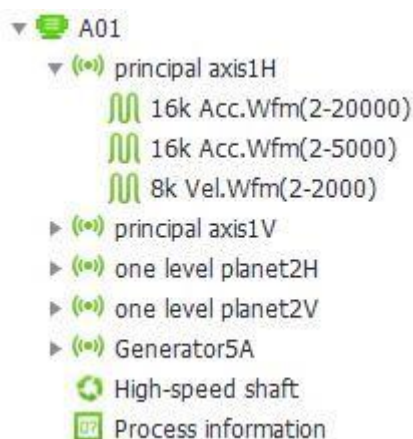
Process

Measuring point name:

Unit type:

Engineering unit:

The full / complete configuration tree of one equipment is as follows:

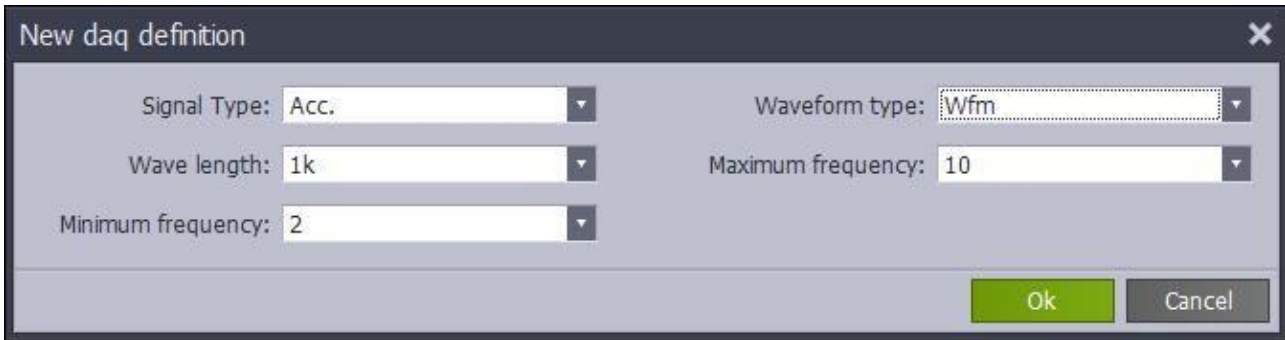


2.4.DAQ Definition Configuration

DAQ Definition Group is used to configure the parameters of vibration (Dynamic) data collection, like analysis frequency, wave length, etc. System provides two types of DAQ definition groups: system and user-defined. System saves the frequently-used DAQ definition group as system type DAQ definition group. Users can add and use directly. For some special DAQ definition group configuration, system provides user-defined DAQ definition group function to facilitate users to define the DAQ definition group. Select DAQ definition group management in the system menu to open DAQ definition group management window:

Daq definition	
<div> <div>New</div> <div>Edit</div> <div>Delete</div> <div>Up</div> <div>Down</div> </div>	
Daq definition name	System type
8k Acc.Wfm(2-2000)	User-defined
8k Vel.Wfm(2-2000)	User-defined
16k Acc.Wfm(2-20000)	User-defined
1k Dis.Wfm(2-500)	User-defined
1k Acc.Wfm(2-10)	User-defined
1k Vol.Wfm(2-10)	User-defined
16k Acc.Wfm(2-15000)	User-defined
1k Dis.Wfm(2-1000)	User-defined
16k Acc.Wfm(2-5000)	User-defined
2k Acc.Wfm(2-5000)	User-defined
1k Acc.Wfm(2-500)	User-defined
128k Acc.Wfm(2-20000)	User-defined
128k Acc.Wfm(2-2000)	User-defined
128k Acc.Wfm(2-40000)	User-defined
64k Acc.Wfm(2-20000)	User-defined
128k Vel.Wfm(2-20000)	User-defined
400 linesAcc.Spe.(2-10)	User-defined
800 linesAcc.Spe.(2-10)	User-defined
1600 linesAcc.Spe.(2-10)	User-defined
3200 linesAcc.Spe.(2-10)	User-defined

1 . Click “New” to edit the DAQ definition group:



DAQ definition group includes the following parameters:

- 1) Signal types: Acceleration, velocity, displacement, voltage, current
- 2) Measurement units: The available measurement units vary according to the different types of signals. If selecting acceleration as the signal type, m/s² or g will be the options.
- 3) Waveform types: Time domain waveform or spectrum
- 4) Fmin: Signal lower than the lower limit will be restrained.
- 5) Fmax: i.e. maximum analysis frequency; this setting actually defines the cut-off frequency and sample frequency of low pass filter.
- 6) Spectrum lines: Define the length of spectrum data
- 7) Wave length: Define the length of waveform data

2 . If users need to change the created DAQ definition group, choose the target DAQ definition group, then click “Edit”.

3 . If users need to delete the created DAQ definition group, choose the target DAQ definition group, then click “Delete”.

4 . If users need to change the order of DAQ definition groups, choose the target DAQ definition group, then click “Up” or “Down”.

2.5. Alarm Level Setting

Click “Alarm level setting”, enter into alarm level setting page. In this page, users can define the alarm level name, like, ONE, TWO, THREE, FOUR, or A, B, C, D, etc. The alarm level colors can also be user-defined:

Alarm setting

Alarm level:

1

2

3

4

Alarm color:

Alarm name:

Level I

Level II

Level III

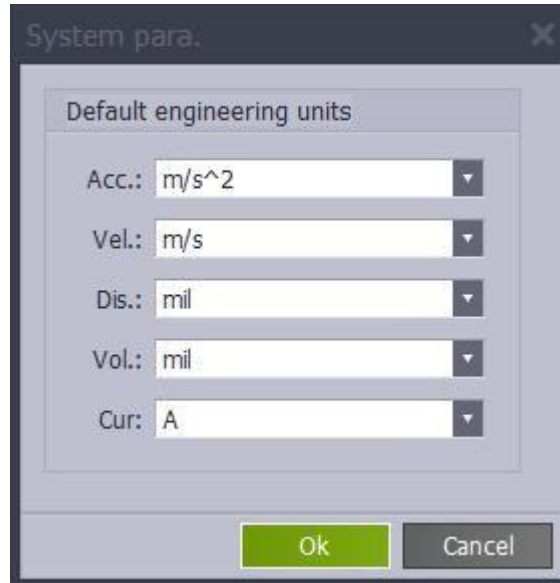
Level IV

Ok

Cancel

2.6. System Parameter

In the system parameter page, it is mainly for setting the default engineer units:



System para.

Default engineering units

Acc.: m/s²

Vel.: m/s

Dis.: mil

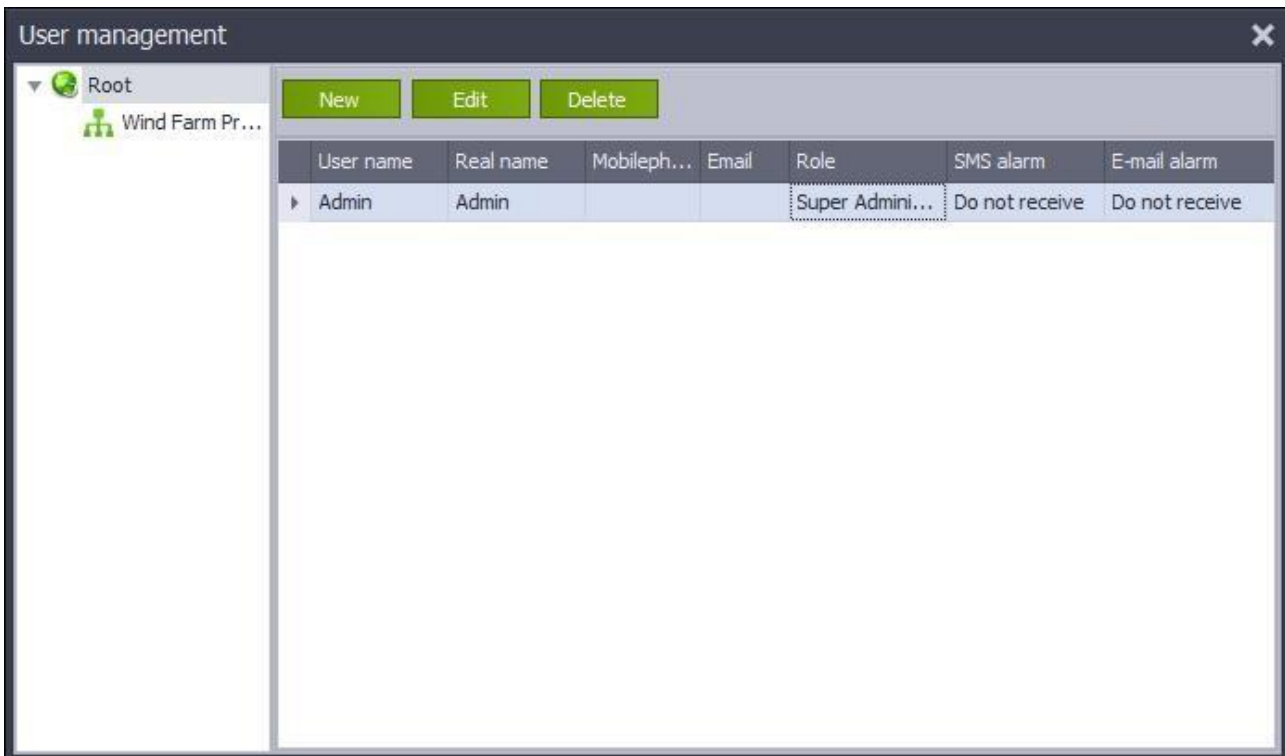
Vol.: mil

Cur.: A

Ok Cancel

2.7. User Management

If the user has authority, then he can create and edit users for this system. Click “User Management” to have the following interface, the user by default is “Admin”.



User management

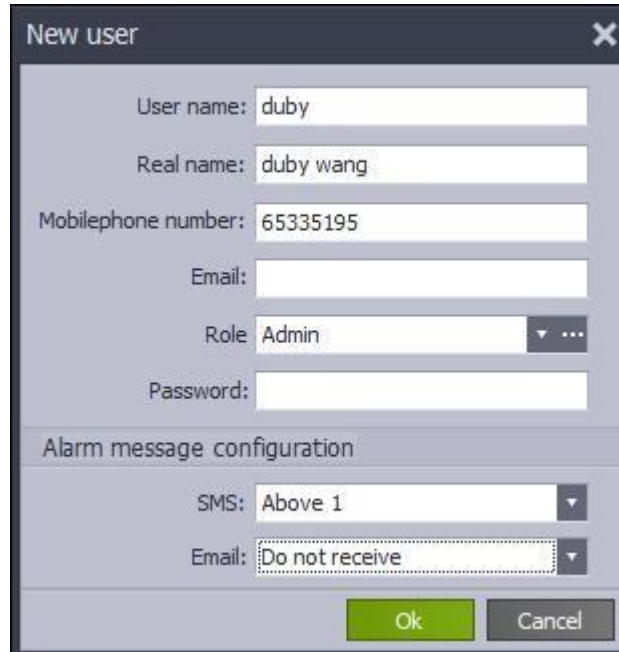
Root

Wind Farm Pr...

New Edit Delete

User name	Real name	Mobileph...	Email	Role	SMS alarm	E-mail alarm
Admin	Admin			Super Admini...	Do not receive	Do not receive

Click “New”, a window for adding new users will pop up. When adding new users, you can set their rights.



The image shows a 'New user' dialog box with the following fields and options:

- User name: duby
- Real name: duby wang
- Mobilephone number: 65335195
- Email: (empty)
- Role: Admin (dropdown menu)
- Password: (empty)
- Alarm message configuration:
 - SMS: Above 1 (dropdown menu)
 - Email: Do not receive (dropdown menu)

At the bottom, there are 'Ok' and 'Cancel' buttons.

Choose one user from the user list, click “edit” or “delete” to conduct the corresponding operations.

3. Online Management

After creating measuring points and DAQ definitions, users can add collection station in the collection station management, and configure the related parameters. The purpose of configuring collection station is to send software configuration of measuring points and DAQ definitions to hardware collection station. Collection station will start collecting data only after receipt of the relevant configuration information, and upload data to software for displaying.

3.1. Online Management

Click “online management”, open the following window:

<div> <div>New</div> <div>Edit</div> <div>Delete</div> <div>Main-sub station setting</div> <div>Issued ▼</div> </div>			
Collection station	Collection stati...	Server name	Equipment under monitoring
10000001	RH1000V4	180	10000001
10000002	RH1000V4	180	10000002
10000003	RH1000V4	180	10000003
10000004	RH1000V4	180	10000004
10000005	RH1000V4	180	10000005
10000006	RH1000V4	180	10000006
10000007	RH1000V4	180	10000007
10000008	RH1000V4	180	10000008
10000009	RH1000V4	180	10000009

3.1.1. New Collection Station

First of all, make sure that you have already added at least one database for saving online historical data in the system configuration tools. Click “New” in collection station management, open the following window:

New collection station

Basic configuration Collection strategy

Collection station info.

Type: RH1000V4 Code: 1000 0088

Server name: 180 Collection mode: Continuous collection

Equipments under monitoring

A01

Channel configuration

Vibration channel	Speed channel	Processing information Channel	Sway channel					
Channel number	Speed channel	Associated measuri...	Signal type	Sensitivity coe...	Whether shut...	Machine halt t...	Multiples of long...	Whether enlarge the density of lon...
1	Speed1	A01\principal axis1H	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
2	Speed1	A01\principal axis1V	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
3	Speed1	A01\one level plan...	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
4	Speed1	A01\one level plan...	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
5	Speed1	A01\Generator5A	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
6	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
7	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
8	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
9	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
10	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
11	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
12	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
13	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
14	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
15	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
16	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>

Ok Cancel

Input collection station code (like 10000088) in collection station code area, choose the corresponding collection station type and server name (where data saved), choose equipment type (variable speed and steady speed), then choose the equipment to be associated.

3.1.1.1. Vibration Channel

Click “next” in creating collection station window, it will pop up the window of channel configuration as follow:

Channel configuration

Vibration channel	Speed channel	Processing information Channel	Sway channel					
Channel number	Speed channel	Associated measuri...	Signal type	Sensitivity coe...	Whether shut...	Machine halt t...	Multiples of long...	Whether enlarge the density of lon...
1	Speed1	A01\principal axis1H	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
2	Speed1	A01\principal axis1V	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
3	Speed1	A01\one level plan...	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
4	Speed1	A01\one level plan...	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
5	Speed1	A01\Generator5A	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
6	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
7	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
8	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
9	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
10	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
11	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
12	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
13	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
14	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
15	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>
16	Speed1	None	Acc.	10	<input type="checkbox"/>	0	1	<input type="checkbox"/>

Choose the content to edit or choose from the options. If you need to configure the associated measuring point of vibration channel 1, select vibration channel 1 associate

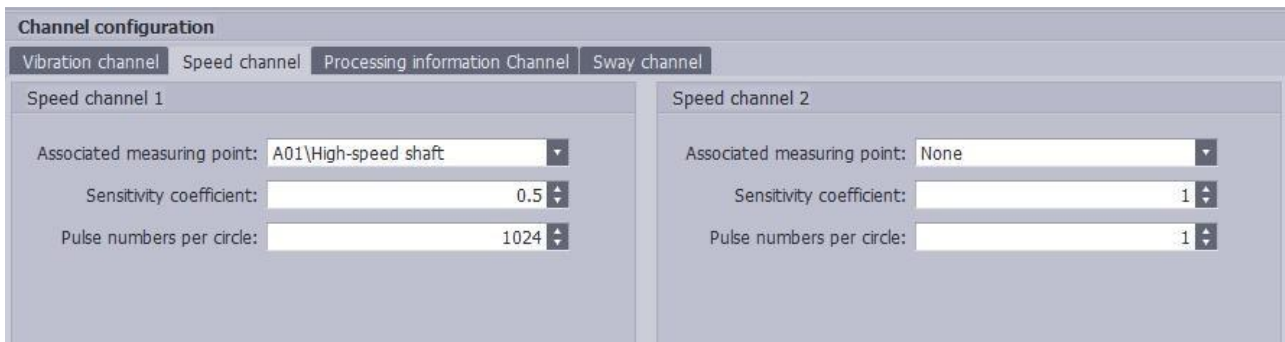
measuring point list, click drop-down arrow to choose from the available measuring point list. See the above photo as a sample which configure vibration channel 1, 2 and 3. Click “Save” to save the configuration.

Explanation of vibration channel parameters is as follows:

- Channel No.: channel number which VMS504 supports, current VMS504 supports 16 vibration channels
- Associate measuring point: create measuring point under corresponding equipment
- Signal type: sensor type
- Sensitivity coefficient: sensor sensitivity coefficient
- Measure temperature: whether to upload temperature data
- Halt threshold value: condition for judging the machine halt for variable equipment
 - Multiples of long waveform DAQ circle: 1,2,4 available. If long waveform circle is set as 4 hours, when choosing 2, the DAQ circle will be $4 \times 2 = 8$ hours. One collection station shall have no more than 2 kinds of multiples, choosing from 1, 2, 4.
- Increase density of long waveform DAQ: used together with multiples of long waveform DAQ circle. Only when starting increasing density of long waveform DAQ, the multiple of long waveform DAQ circle is valid. Otherwise, it will not work.

3.1.1.2. Speed Channel

Click “Speed channel”, users can configure speed channel:



The screenshot shows the 'Channel configuration' window with tabs for 'Vibration channel', 'Speed channel', 'Processing information Channel', and 'Sway channel'. The 'Speed channel' tab is active, showing two columns for 'Speed channel 1' and 'Speed channel 2'.

Speed channel 1	Speed channel 2
Associated measuring point: A01\High-speed shaft	Associated measuring point: None
Sensitivity coefficient: 0.5	Sensitivity coefficient: 1
Pulse numbers per circle: 1024	Pulse numbers per circle: 1

3.1.1.3. Process Information Channel

Click “Process information channel”, users can configure process information channel:

Channel configuration					
Vibration channel	Speed channel	Processing information Channel	Sway channel		
Channel number	Associated measuring point	Input quantity lower limit	Input quantity upper limit	Output quantity lower limit	Output quantity upper limit
1	A01\Process information	1	5	10	50
2	None	0	1	0	1
3	None	0	1	0	1
4	None	0	1	0	1

- Upper/lower limit of signal: input upper/lower limit of on-site real signal. Move mouse to this list, prompt box will pop up, as above.
- Upper/lower limit of physical quantity: upper/lower limit of real output value, according to this and upper/lower limit of signal can make the linearity between them.

3.1.1.4. Sway Channel

The configuration of sway channel is the same like vibration channel.

Channel configuration		
Vibration channel	Speed channel	Processing information Channel
Channel number	Associated measuring point	Sensitivity coefficient
1	A01\XX_6Dynamic_MeasureV	100
2	A01\XX7_Dynamic_MeasureH	100
3	A01\XX_8Dynamic_Measure	100
4	A01\XX_9Dynamic_Measure	100

3.1.2. Edit Collection Station

If user wants to change the added information of collection station, you can click “Edit” in collection station management window to edit the information of the selected collection station. User can only edit equipment type, server name and the hardware associated to the collection station. The collection station code and type cannot be changed after adding.

3.1.3. Delete Collection Station

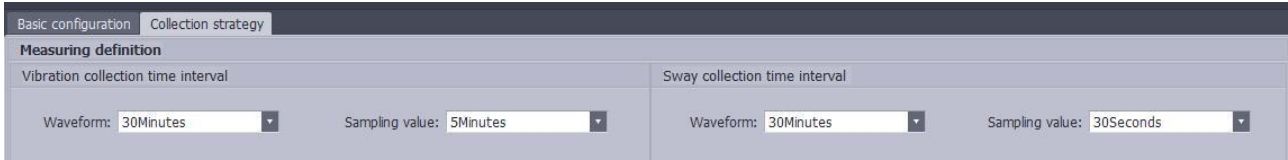
If you do not need the added collection station, you can choose to delete the collection station. Click “Delete” in collection station management to delete it.

3.1.4. Strategy Configuration

Users can set different DAQ interval for different DAQ types, in one collection station. In strategy Configuration, we can configure each strategy by details, and different collection station can be set for different strategy.

3.1.4.1. DAQ Definition, Sampling Value

Click “Collection strategy”, choose “Collection station code” to open the collection configuration page of the corresponding collection station DAQ definition:



Measuring definition		Sway collection time interval	
Vibration collection time interval		Sway collection time interval	
Waveform: 30Minutes	Sampling value: 5Minutes	Waveform: 30Minutes	Sampling value: 30Seconds

Vibration collection time interval:

- ◆ Waveform: interval of vibration channel to collect waveform
- ◆ Sampling value: interval of RMS value, peak to peak value, kurtosis value in sampling value trend

Sway collection time interval:

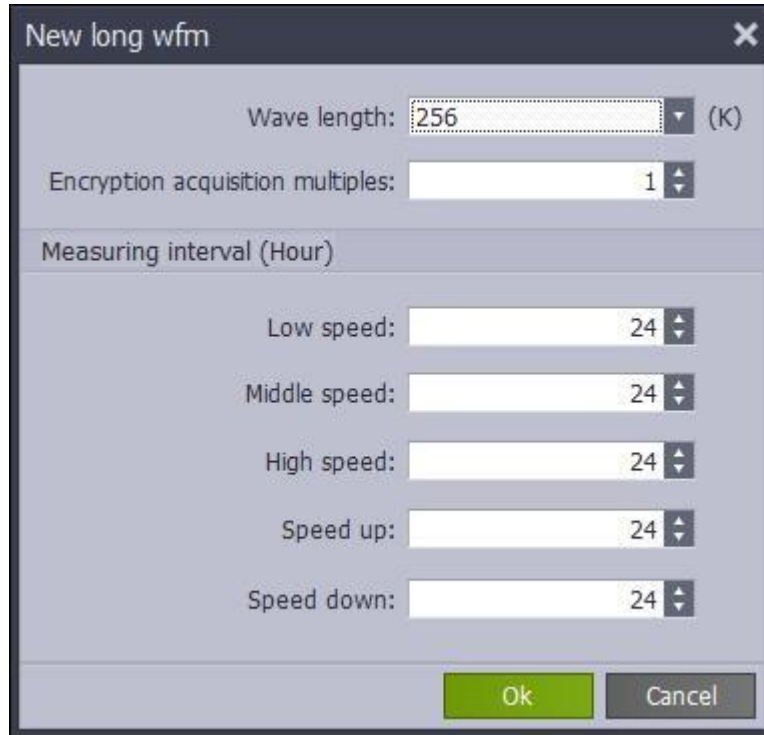
- ◆ Waveform: interval of sway channel to collect waveform
- ◆ Sampling Value: interval of RMS value, peak to peak value in sampling value trend

3.1.4.2. Long Waveform

VMS504 is able to collect long waveform, please check the following steps to configure it.

1) New Long waveform

Click “Long waveform”, switch to long waveform interface:



The 'New long wfm' dialog box contains the following fields and controls:

- Wave length:** A text box with '256' and a dropdown arrow, followed by '(K)'.
- Encryption acquisition multiples:** A text box with '1' and up/down arrows.
- Measuring interval (Hour):** A section header.
- Low speed:** A text box with '24' and up/down arrows.
- Middle speed:** A text box with '24' and up/down arrows.
- High speed:** A text box with '24' and up/down arrows.
- Speed up:** A text box with '24' and up/down arrows.
- Speed down:** A text box with '24' and up/down arrows.
- Buttons:** 'Ok' (green) and 'Cancel' (grey) at the bottom right.

Input long waveform parameters; click “OK” to finish. See the image below:

Long Wfm							
<div> New Edit Delete Speed Strategy </div>							
Basic info.			Measuring interval (Hour)				
Signal type	Wave length (K)	Encryption acquisition multiples	Low speed	Middle speed	High speed	Speed up	Speed down
Acc.	256	1	24	24	24	24	24

2) Edit Long waveform

Choose the target long waveform, click “edit” to open long waveform editing window.

3) Speed Strategy

VMS504 long waveform collection is associated with speed value, speed strategy is required to setup after create long waveform. Click “speed strategy” to open the corresponding interface, configure each speed, including upper limit, lower limit, and fluctuation as below:

Edit speed strategy

Strategy One
Strategy two

Speed trend collection interval: 1000 (ms) Min: 1900 (RPM) Max: 100 (RPM)

	Maximal(RPM)	Minimum(RPM)	Fluctuation1(RPM)	Fluctuation2(RPM)
L-speed steady	1000	300	8	50
M-speed steady	1200	1000	15	70
H-speed steady	1900	1600	50	100

	Speed span(RPM)	reverse speed maximum c...	Speed maximum change v...	Minimum speed (rpm)
Speed up	800	30	100	600
Speed down	800	30	100	300

Ok
Cancel

Long waveform collection of Variable speed equipment is associated with speed. So, speed data is required for collection long waveform of variable speed equipment.

◆Speed strategy

For each strategy, variable speed equipment has five kinds of speed: Low speed steady, medium speed steady, high speed steady, speed up and speed down. Long waveform will be collected, if speed is in the following stage:

Low speed steady: Speed is between the Max. and the Min. Moreover, the speed change value during collecting long waveform is not more than the value of Fluctuation 1 (such as 8) or Fluctuation 2.

Medium speed steady: Speed is between 1600 and 1900. Moreover, the speed change value during collecting long waveform is not more than the value of Fluctuation 1 (such as 15) or Fluctuation 2.

High speed steady: Speed is between 1000 and 1200. Moreover, the speed change value during collecting long waveform is not more than the value of Fluctuation 1 (such as 50) or Fluctuation 2.

Speed Up: Speed is not less the min. speed and rising. The speed change value between Max. and Min. is more than speed span (such as 800) during collecting long waveform, the speed difference from the beginning to the end is less than speed max. change (such as 100), and more then reverse speed max. (such as 30).

Speed Down: Speed is not less the min. speed and declining. The speed change value between Max. and Min. is more than speed span (such as 800) during collecting long waveform, the speed difference from the beginning to the end is less than speed max. change (such as 100), and more then reverse speed max. (such as 30).

Boundary Value: interval 1,2,3 include boundary value for the min. limitation, don't include the max. limitation, fluctuation don't include boundary value (it should be less than the setup value).

Speed span should be bigger than the boundary value, reverse speed max., max. speed change, min. speed don't include boundary value.

◆Long waveform collection

When equipment speed meets any of these five speed kinds, long waveform will be saved. So, it has five kinds of a long waveform: low speed steady long waveform, medium speed steady long waveform, high speed steady long waveform, speed up long waveform and speed down long waveform.

3.1.4.3. Process value collection

It is used to setup measuring interval of temperature data and process information data, see the image below:



Temperature measuring interval: time interval for uploading temperature, unit: minute.
Process information collection interval: time interval for uploading process information, unit: minute.

3.2. System Maintenance

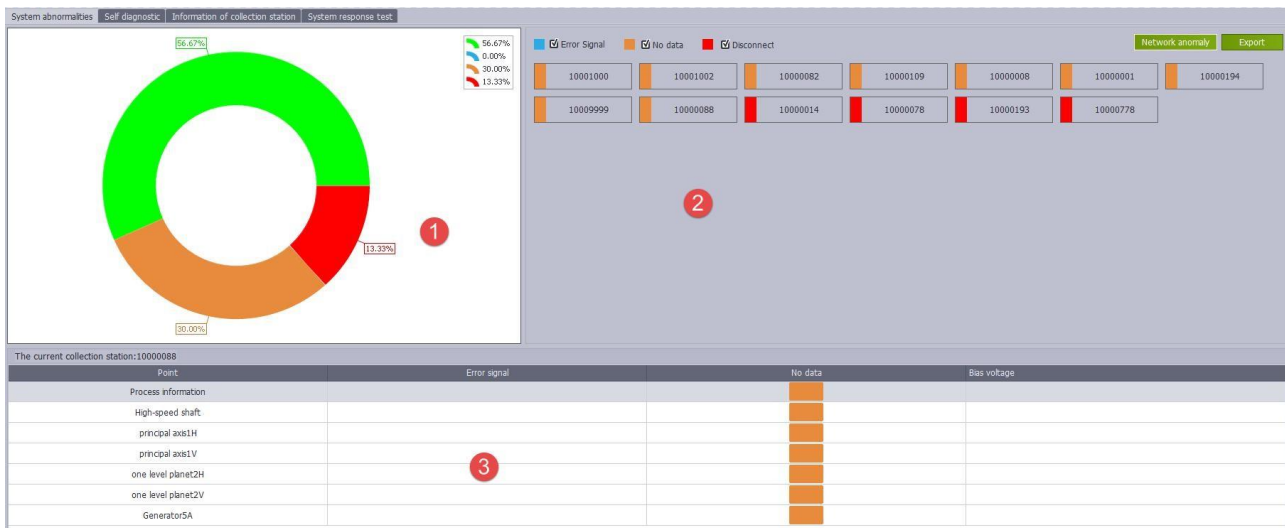
System maintenance center provides the following function:

Function	Explanation
System abnormalities	Display Condition monitoring system anomaly record
Self-diagnostic	Display VMS504 self-diagnosis information

Information of collection station	Display All collection station hardware and software version information
Firmware upgrade	Upgrade all collection stations of the system
System response test	Display response time to the important operation

3.2.1. System abnormalities

1 . Anomaly records consist of the parts, as follow:



Area	Explanation
1	Display the equipment overall situation of current equipment, listed in percentage, including disconnected, data loss, error signal and normal
2	Display collection station name with error signal, data loss, disconnection

3

Display chosen collection station, all channels information: error signal, data loss, sensor condition and bias voltage of every channel.

2 . Click the network icon Network anomaly of anomaly records page, it will display the information of network anomaly collection stations. Network anomaly page can calculate times of collection station disconnection and restarting, as follows:

Start time: 2015/02/25 14:07
End time: 2015/02/25 14:07
Collection station: All
Query

Collection station	Disconnection times	Reboot times
05500103	1357	23
10000083	68	13
10000120	43	11
05500002	350	18
11000016	1	1
11000015	3	3
10000015	35	17
10000016	7	2
10000193	14	14
10000778	23	12
10000779	50	16
10001110	113	99
10000079	8	4
11000014	5	1
10000104	30	13
10000014	56	33
10000078	111	26
05500104	1	1
10000194	6	4
10000780	55	40

3.2.2. Self-diagnostic

1 . VibAnalyser5000 Online Monitoring Software can realize self-diagnosis, capable of diagnosing the collection, storage, system condition, network status, system communication and diagnosis time, as follow:

System abnormalities Self diagnostic Information of collection station System response test							Query	Export
Current state Historical error		Start time: 2015/02/23 14:10 End time: 2015/03/23 14:10		Collection station: All				
Collection station	Collection	Storage	Status	Communication	Diagnosis time	Details		
10000083	✓	✓	✓	✗	2015/03/25 13:54	Check		
10000194	✓	✓	✗	✓	2015/03/25 13:49	Check		
11000015	✓	✓	✗	✓	2015/03/16 15:46	Check		
11000016	✓	✓	✓	✗	2015/03/10 17:12	Check		
10000014	✓	✓	✓	✗	2015/03/24 0:16	Check		
10000016	✗	✓	✓	✗	2015/03/25 14:10	Check		
10001110	✓	✓	✓	✓	2015/03/24 17:47	Check		
10000015	✓	✓	✗	✓	2015/03/25 14:07	Check		
10000193	✓	✓	✗	✓	2015/03/19 10:12	Check		
10000079	✓	✓	✓	✓	2015/03/24 17:47	Check		
11000014	✓	✓	✓	✓	2015/03/16 10:32	Check		

2 . Click “Check” in details, it will display the following self-diagnosis information:

Self diagnostic report

Collection

FPGA communication: ✓

Acc. sampling frequency: ✓

Dis. sampling frequency: ✓

Storage

SRAM: ✓

SDRAM: ✓

FRAM: ✓

NandFlash: ✓

Status

RTC: ✓

Main board 12V Voltage: ✗

Main board 5V Voltage: ✓

Main board 2.5V Voltage: ✓

Main board 1.2V Voltage: ✓

Communication

AD1: ✓

AD2: ✓

baseboard: ✓

Sway board: ✓

Network status

Network SNR: 54.4

Network theory length: 2.0

Details of diagnosis include the following:

Collection	FPGA	Normal/Abnormal
	Acceleration Sampling frequency	Normal/Abnormal
	Displacement sampling frequency	Normal/Abnormal
Storage	SRAM	Normal/Abnormal
	SDRAM	Normal/Abnormal
	FRAM	Normal/Abnormal
	NandFlash	Normal/Abnormal
Status	RTC	Normal/Abnormal
	Main board 12V voltage	Normal/Abnormal

	Main board 5V voltage	Normal/Abnormal
	Main board 2.5V voltage	Normal/Abnormal
	Main board 1.2V voltage	Normal/Abnormal
Network status	Network SNR	Normal/Abnormal
	Network theory length	Normal/Abnormal

Communication	AD1	Normal/Abnormal
	AD2	Normal/Abnormal
	Base board	Normal/Abnormal
	Sway board	Normal/Abnormal

3 . Click “Historical anomaly”, it will display historical record of collection station anomaly information.

3.2.3. Information of collection station

1 . Collection station information can display the information of all collection station in this system, including collection station code, MAC address, main-board, baseboard, AD board 1, AD board 2, sway board and FPGA hardware & software version, as the following:

System abnormalities

Self diagnostic

Information of collection station

System response test

Version category: All

Version: All

Query

Export

Collection station

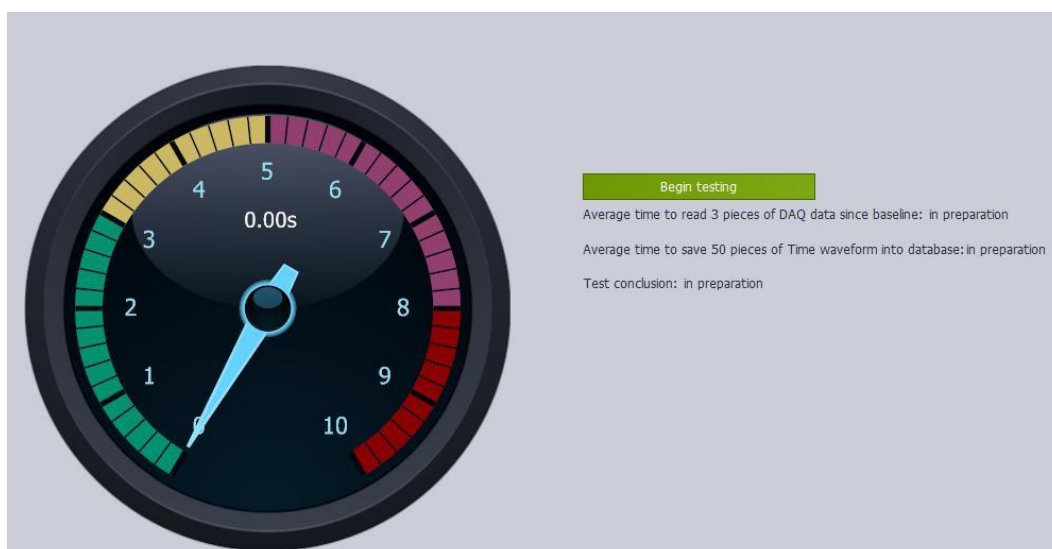
Version category	Main control board	Baseboard	AD board 1	AD board 2	Sway board	FPGA
Collection station: 10000078(IP:192.168.1.20:1045 MAC:02 03 10 00 00 45)						
Collection station: 10000079(IP:192.168.1.55:4110 MAC:02 03 10 04 03 F6)						
Software version	4.10.3.3920	110	108		134	18
Hardware version	RH1000MC4.3	RH1000MB3.12	RH1000AD3.3		RH1000SY3.0	
Serial number	MC042F	MB0622	AD0763		SY0185	
Collection station: 10000083(IP:192.168.1.53:4116 MAC:02 03 10 04 05 E8)						
Software version	4.90.3.3917	110	108		0	18
Hardware version	RH1000MC4.3	RH1000MB3.12	RH1000AD3.3			
Serial number	MC042F	MB0622	AD0763			

2 . Collection station information can be inquired by version type or version number, see above figure.

3 . Collection station information can be exported.

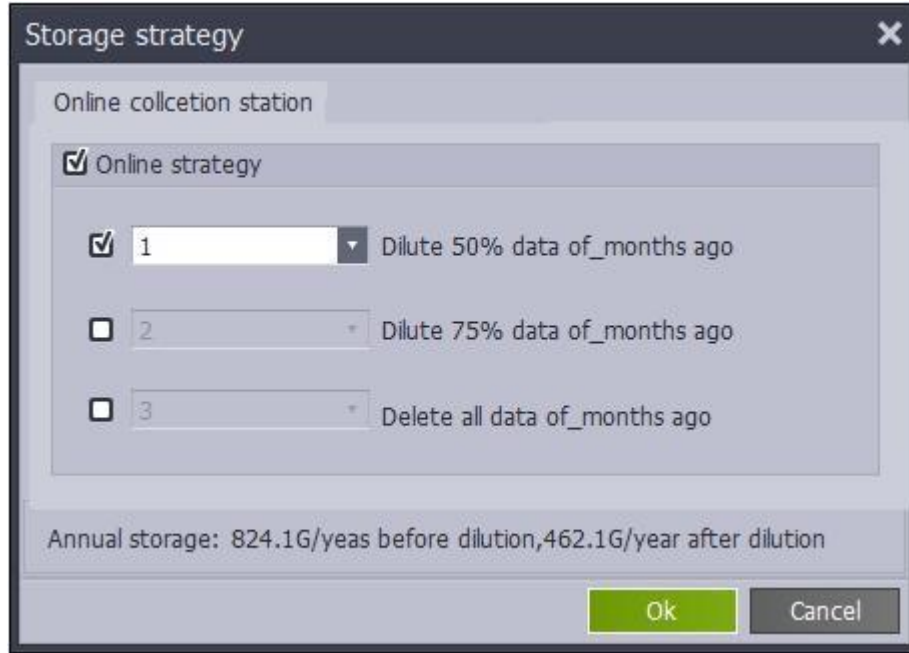
3.2.4. System Response Test

User can check Network transmission speed, time for reading data and time for storing data.



3.3. Data Storage

In the window of the data storage strategy, users can set the storage strategy of historical data that collected by data collector, every day the system will delete some data within the set time to dilute the original data time interval, the purpose is to reduce the data volume and avoid rapid expansion of database. The dilution period can be customized by data volume, if users are not sure about the data volume, default setting is recommended to use. As the following figure, the data before 5 months will be saved by DAQ density of 50%, the data before 8 months will be saved by DAQ density of 25%, the data before 12 months will be deleted all. Meanwhile, all of the data that has reference value will be saved according to the data storage strategy of system, for example, the alarming data will be saved in system permanently and will not be limited by the storage strategy.



Storage strategy

Online collection station

☒ Online strategy

☒ 1 Dilute 50% data of _months ago

☐ 2 Dilute 75% data of _months ago

☐ 3 Delete all data of _months ago

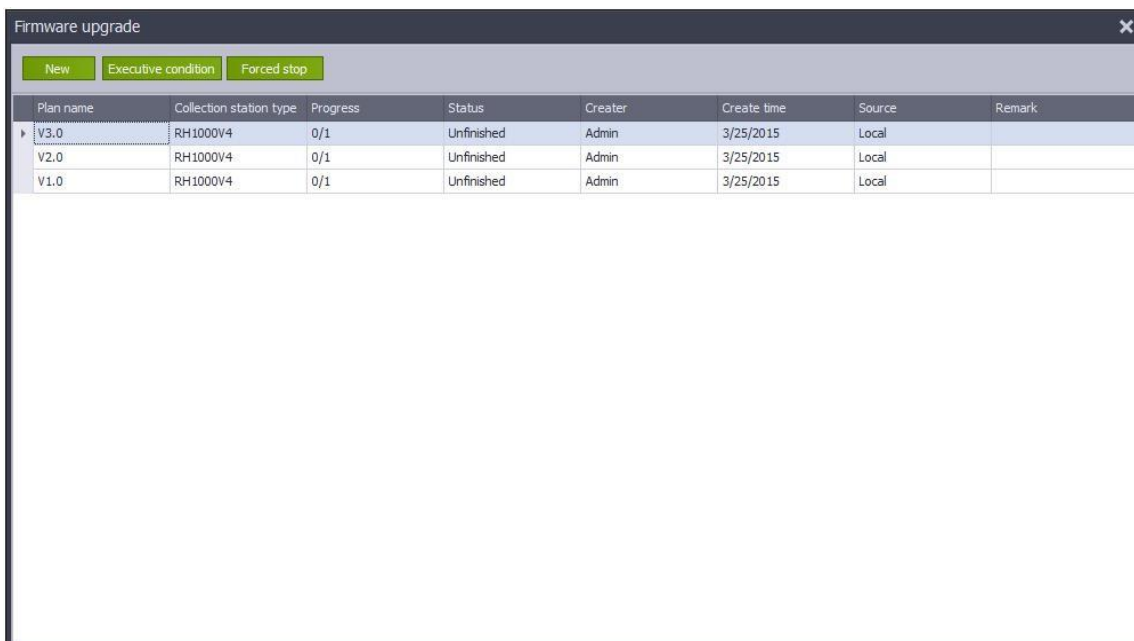
Annual storage: 824.1G/yeas before dilution,462.1G/year after dilution

Ok Cancel

3.4.Firmware Upgrade

Collection station upgrade is mainly for on-site engineers for software version upgrading of all on-site collection station.

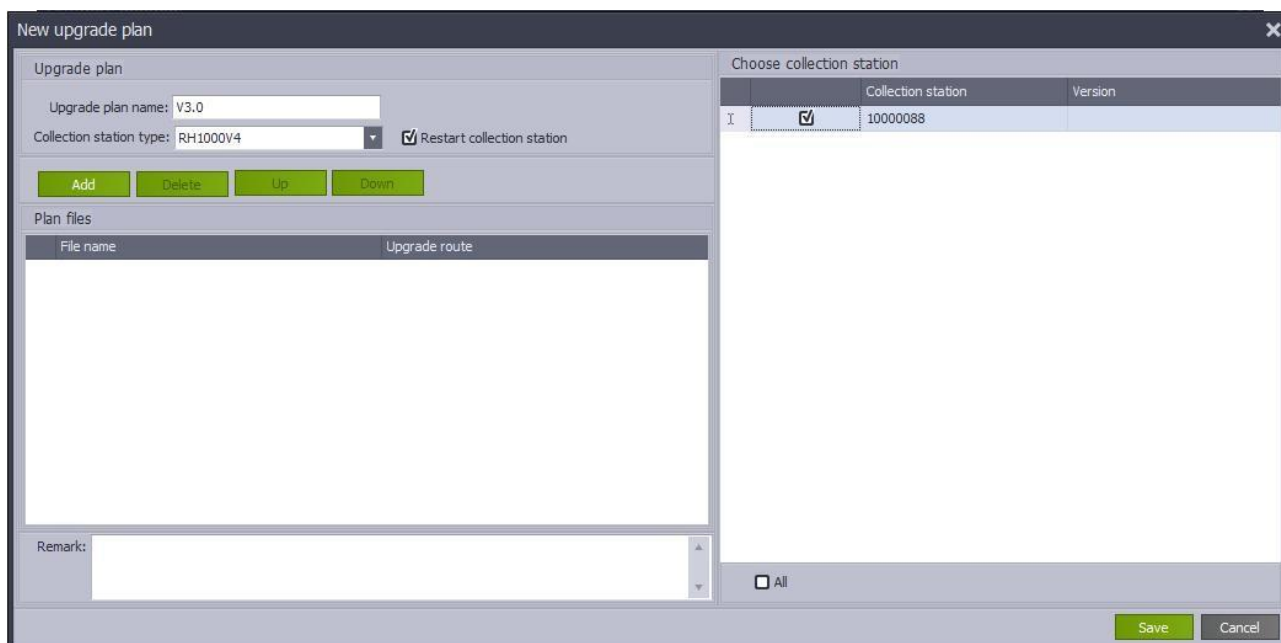
1 . Click “Collection station upgrade”, open collection station upgrade page, which will display all the historical upgrade programs, as follow:



Firmware upgrade							
New Executive condition Forced stop							
Plan name	Collection station type	Progress	Status	Creator	Create time	Source	Remark
V3.0	RH1000V4	0/1	Unfinished	Admin	3/25/2015	Local	
V2.0	RH1000V4	0/1	Unfinished	Admin	3/25/2015	Local	
V1.0	RH1000V4	0/1	Unfinished	Admin	3/25/2015	Local	

3.4.1. Create Upgrading Plan

1 . Click “New” in collection station upgrade main page, open new upgrade program,
as follow:



New upgrade plan

Upgrade plan

Upgrade plan name: V3.0

Collection station type: RH1000V4 ☒ Restart collection station

Add Delete Up Down

Plan files

File name	Upgrade route
-----------	---------------

Remark:

Choose collection station

	Collection station	Version
I	<input checked="" type="checkbox"/> 10000088	

☐ All

Save Cancel

- 2 . Input program name, like “V3.0”.
- 3 . Choose collection station type, like VMS504
- 4 . Input relevant upgrade program information in the remark
- 5 . Add the correct file to be upgraded by adding, delete buttons
- 6 . Change the upgrade file order by up, down buttons
- 7 . Choose collection station code to be upgraded
- 8 . When choosing “restart collection station”, the default is checked. It means when all upgrade files are sent, collection station will restart automatically.
- 9 . Click “Save” button, the upgrade program will be conducted automatically.

3.4.2. Plan Execution Condition

During the execution of upgrade files, users can check the upgrading information. Click “Execution information”, open the corresponding page, you will see upgrading information of the new upgrade programs and associated collection stations, as follow:

Executive condition

Upgrade plan name: V3.0

Status: Unfinished

Collection station type: RH1000V4

☒ Restart collection station

Remark:

Upgrade files	Upgrade route	Times	Upgrade status
Collection station: 10000088 (0/1)			
HWVerSNxxxx...	NandFlash	0	Unfinished

3.4.3. Forced Stop

When executing more than one upgrade plans, it will follow the order of the programs creation time. The earliest created program will be executed first. If certain program can be completed due to certain reason, we can click “Forced stop”, so the next program can continue.

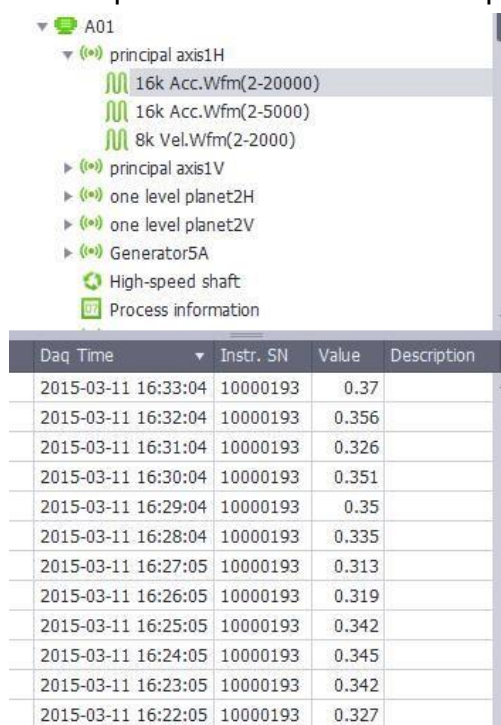
4. Diagnosis Analysis

After configure DAQ strategy and Storage strategy, VMS504 will receive the DAQ parameter from VibAnalyser5000, and then automatically collect data. Data view and analysis can be done in the Diagnosis Analysis.

4.1. Data View

4.1.1. DAQ Definition Data View

On the Diagnosis analysis interface, extend configuration tree to DAQ definition, click the one DAQ definition, it shows the uploaded data in the under part, see as follow:



Daq Time	Instr. SN	Value	Description
2015-03-11 16:33:04	10000193	0.37	
2015-03-11 16:32:04	10000193	0.356	
2015-03-11 16:31:04	10000193	0.326	
2015-03-11 16:30:04	10000193	0.351	
2015-03-11 16:29:04	10000193	0.35	
2015-03-11 16:28:04	10000193	0.335	
2015-03-11 16:27:05	10000193	0.313	
2015-03-11 16:26:05	10000193	0.319	
2015-03-11 16:25:05	10000193	0.342	
2015-03-11 16:24:05	10000193	0.345	
2015-03-11 16:23:05	10000193	0.342	
2015-03-11 16:22:05	10000193	0.327	

4.1.2. Long Waveform Data View

On the Diagnosis analysis interface, extend configuration tree to DAQ point, click the one DAQ point, it shows the uploaded long waveform data in the under par.

4.1.3. Time Waveform Data View

On the Diagnosis analysis interface, extend configuration tree to DAQ definition, click the one DAQ definition, and then click Sampling Value trend in the Graph Analysis.

4.1.4. Speed Data View

On the Diagnosis analysis interface, extend configuration tree to DAQ point, click the speed DAQ point, it shows the uploaded speed data in the under part, speed trend can be view in the Graph Analysis---- Speed Trend.

4.2.Data Analysis

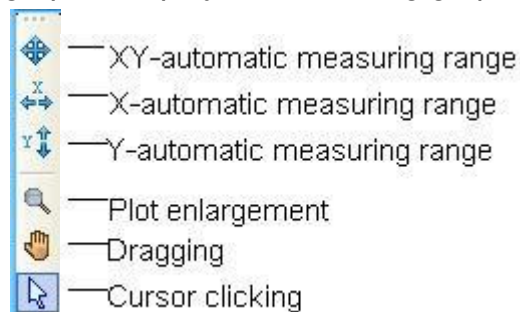
VibAnalyser5000 provides abundant graph analysis functions for condition monitoring, equipment maintenance and diagnosis experts. Users can open all of the graph analysis tools in system regular analysis and transient analysis menu; there are some common analysis tool buttons in the system toolbar.

4.2.1. Graph Common Operation

We can begin with the common operation explanation for the graphs before introducing each analysis function:

1. Graphs control panel

On the left of each analysis graphs, displays the following graphs control panel.



(1) Automatic measuring range

Automatic measuring range is the restore operation after graphics partial enlargement, it can restore X axis(X- automatic measuring range) and Y axis (Y- automatic measuring range) separately, or restore X,Y axis (XY-automatic measuring range) simultaneously.

(2) Enlargement

Graphs enlargement is to partially enlarge the selected graph and have it seen clearly.

(3) Dragging

When click dragging button, the cursor on the graphs will change to hand shape, users can use mouse to drag the graphs as needed.

(4) Cursor clicking

Click cursor first, then click graph and move cursor to any position of the graph.

For some similar analysis graphs, there will be some additional buttons on the toolbar on the top of the graphs control panel, such as:



: Double cursor, displayed as two cursors on waveform or multi waveform graphs after clicking



: Harmonic cursor, displayed on spectrum or multi spectrum analysis graphs; it will display harmonic cursor on graph after clicking



: Side frequency cursor, displayed at both sides of the central cursor symmetrically on spectrum or multi spectrum analysis graphs after clicking, it will be moved along with central cursor and adjust the frequency differences between central cursor and side frequency cursor.

1. Right Click Menu

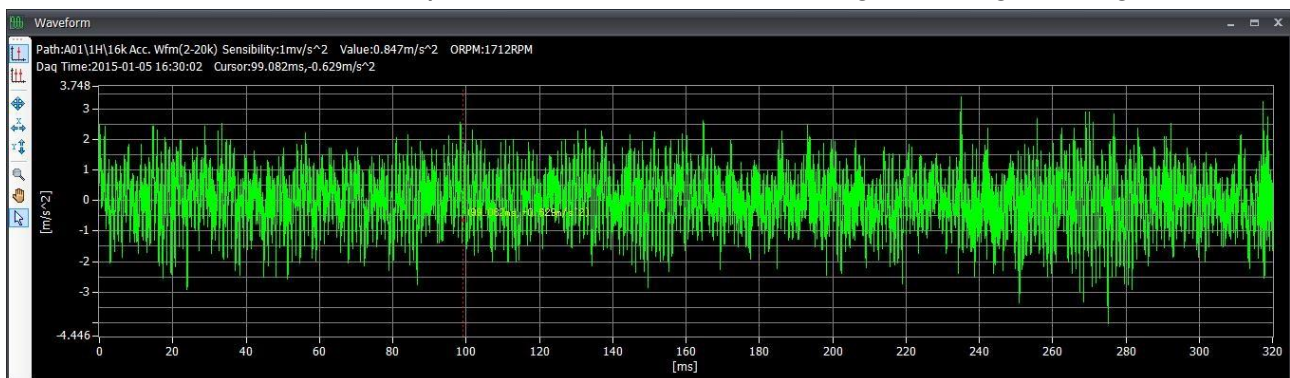
- “Display dynamic cursor”: The dynamic cursor value will be displayed on the graph when selected this cursor.

- “Locked graph”: The graph will not be changed along with any operation when selected it.
- Click “Note” will has Note windows, input the note content and click “OK”, then the note content will be displayed in the cursor position (default content is the cursor value).
- Select “Clear notes” to delete all markings at current graph.
- When checking the sub-items under “interface setting”, the selected content will be displayed on the graph, and no displaying conversely.
- When choose enabled state of the “drag and drop control”, users can enlarge or restore graphs by mouse.

In different graph analysis windows, the items on right click menu are different more or less.

4.2.2. Time Domain Waveform

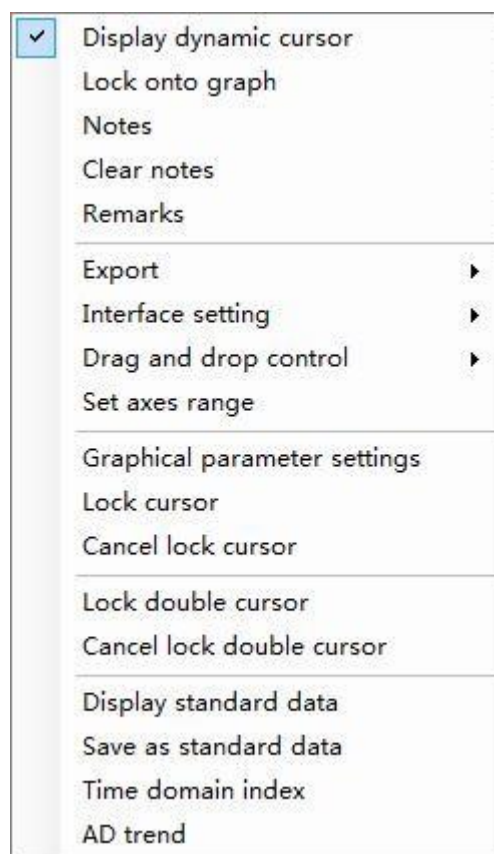
Waveform reflects the amplitude of collected vibration signal changes along with time.



- (1) Interface: The central interface is the graphic display area, the top of interface displays some assistance information (such as measuring point route, measuring value, measuring time etc.)

Operation:

Right click the graph, displays the following menu:



The following is the explanation for some special items:

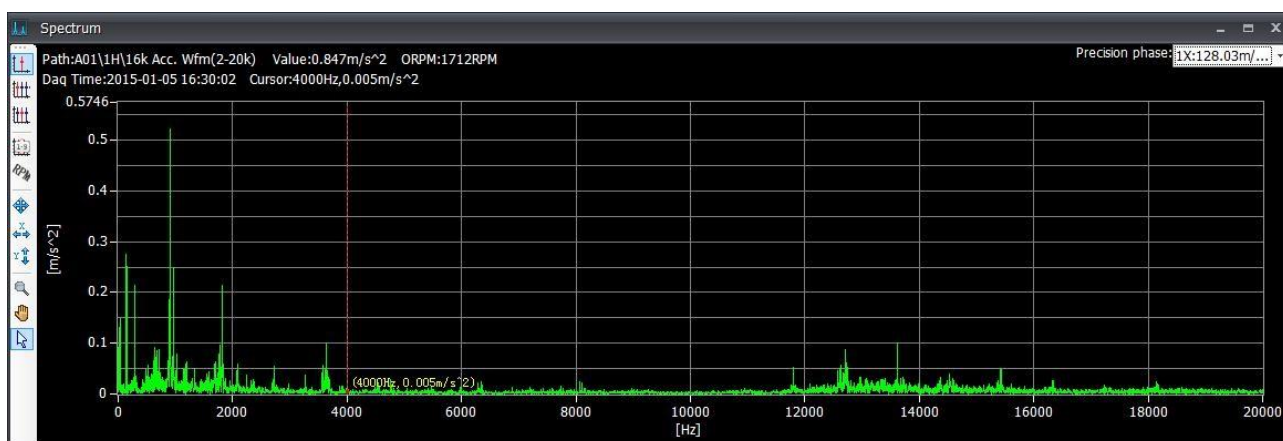
■ Save as standard data:

Save the current waveform data as standard data for future data comparative analysis.

■ Display standard data:

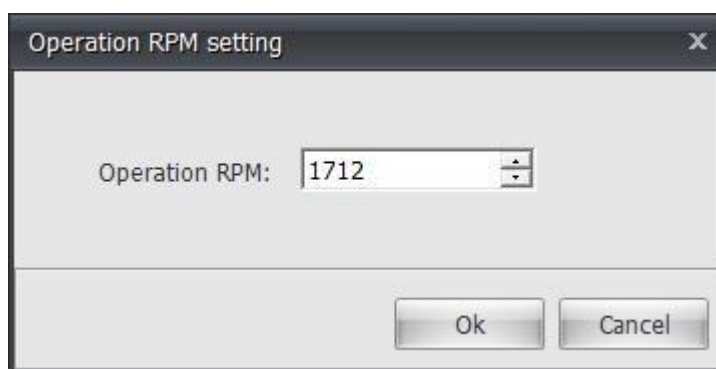
Display previously saved standard data with current collected data under the same coordinate, this is convenient for users to have data comparative analysis. The standard data must be the same DAQ definition collected in different time.

■ Time domain index: Display all corresponding index values of current waveform time domain index.



Right click menu:

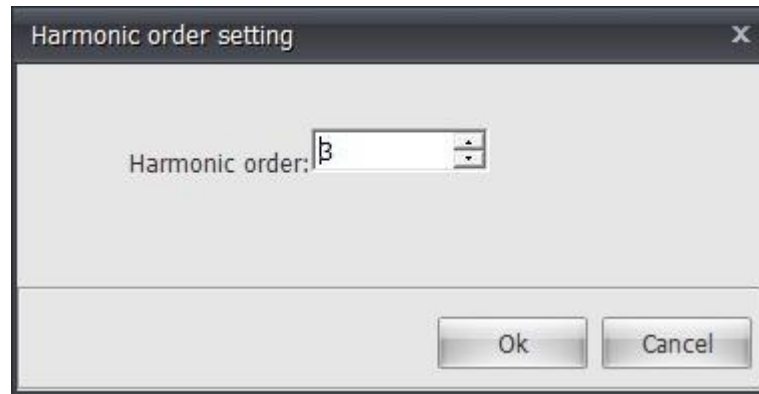
- Main peak value qty.: used to set displayed main peak number.
- Spectrum main peak value: display main peak information of current data spectrum.
- Mark main peak value: display main peak information of the established peak number in the spectrum analysis graph.
- Operating RPM setting: users can adjust the operating RPM for some equipment as needed.



- Characteristic frequency tree: display corresponding characteristic frequency information of the spectrum analysis in current sampling data. Users need to input bearing type, number of gear teeth, motor RPM, pulley diameter and other

component parameter under configuration mode, the system will calculate the fault characteristic frequency automatically and mark it on the spectrum graph directly.

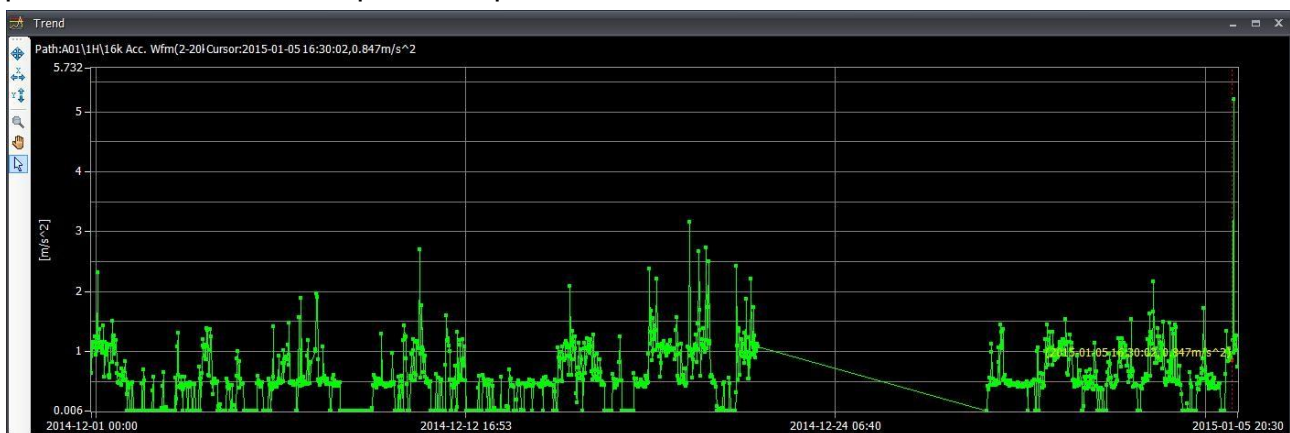
- Harmonic order setting: users can set harmonic times according to some data as analysis demands.



With the increasing or decreasing setting of the harmonic times, the axis number on the characteristic frequency tree will be changed synchronously.

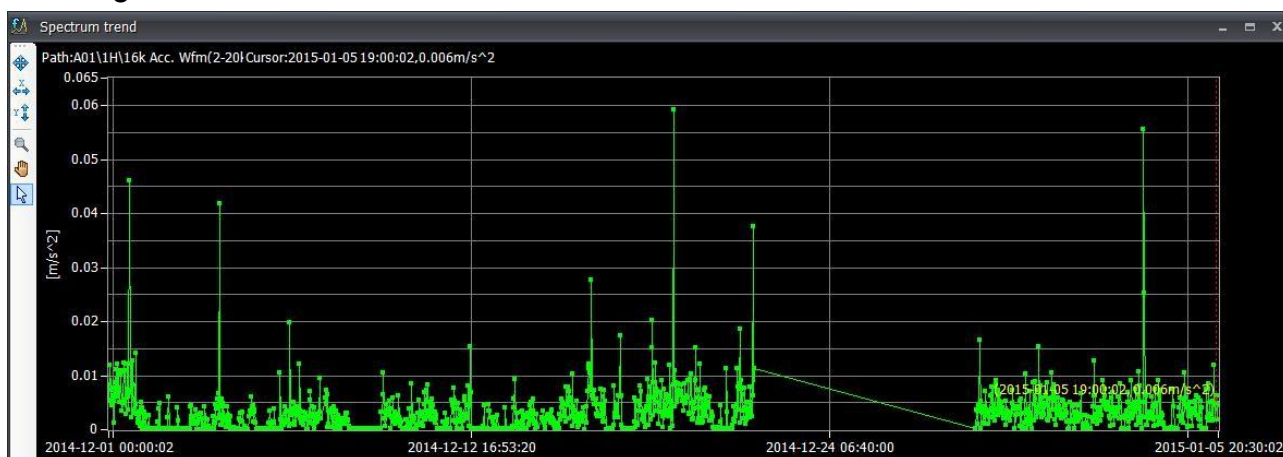
4.2.4. Trend, Frequency Trend Analysis

(1) Trend analysis reflects the changing information for some characteristic parameter value of one measuring point during certain time range. Trend analysis not only can analyze each time domain dimension parameter and dimensionless parameter of vibration, but also can have trend analysis and managing for process information parameters, such as temperature, pressure, flow, current etc.



(2) Frequency trend analysis can display multi data from same frequency component value.

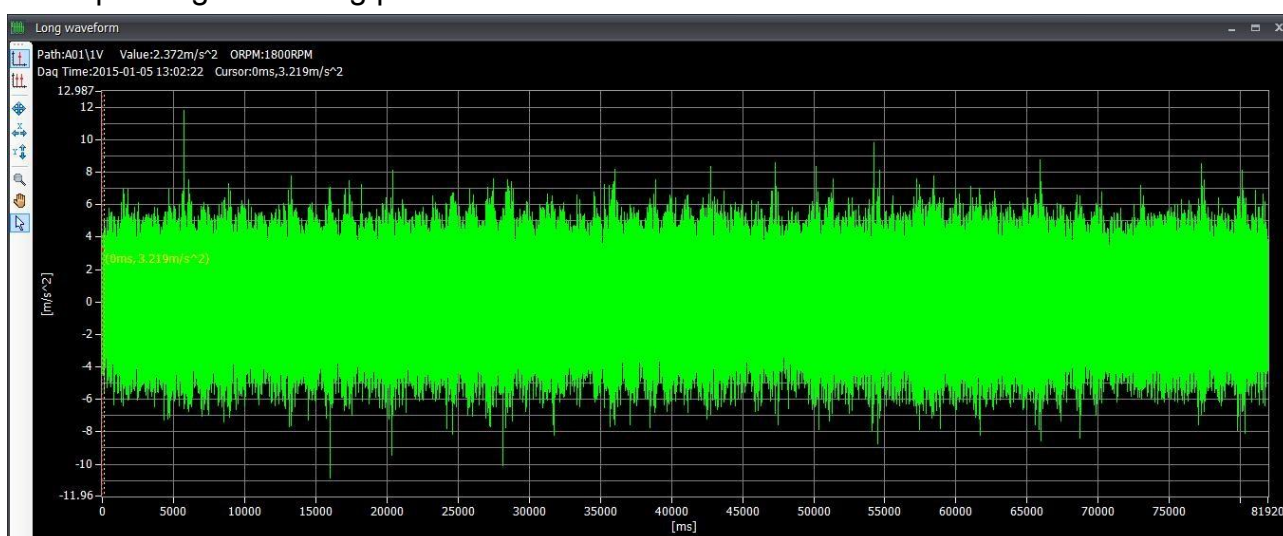
Click spectrum analysis button from toolbar, open the spectrum analysis graph, then open the spectrum trend graph under routine analysis menu, the data will be displayed as following:



Move mouse in the spectrum analysis window, the corresponding spectrum analysis graph will be generated for analysis and diagnose according to current mouse position.

4.2.5. Long Waveform

Long waveform records the waveform during a certain time range. It's equivalent to a tape recorder. The multi manual collected data of RH1000 will be saved as long waveform under corresponding measuring point.



As for the long waveform data, users can select any band from it for time domain and



spectrum analysis, or have complete waterfall plot analysis after set a band length and time interval.

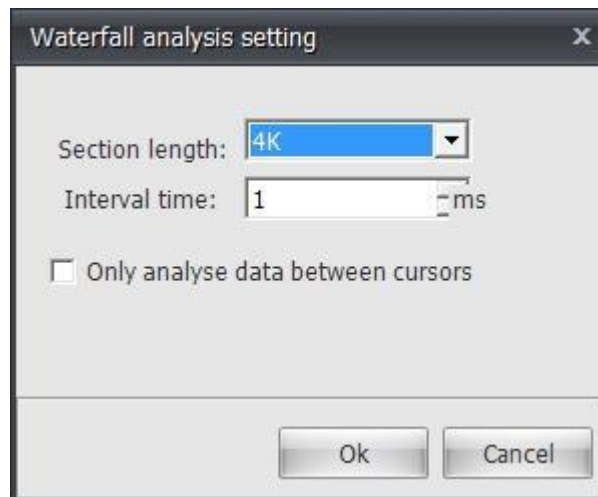
Right click menu: :

- Section length:

Section length: Users can select different section length; have time domain and spectrum analysis for the selected section from long waveform through time domain and spectrum analysis. The selected section can't be longer than the maximum length of the long waveform.

- Waterfall analysis setting

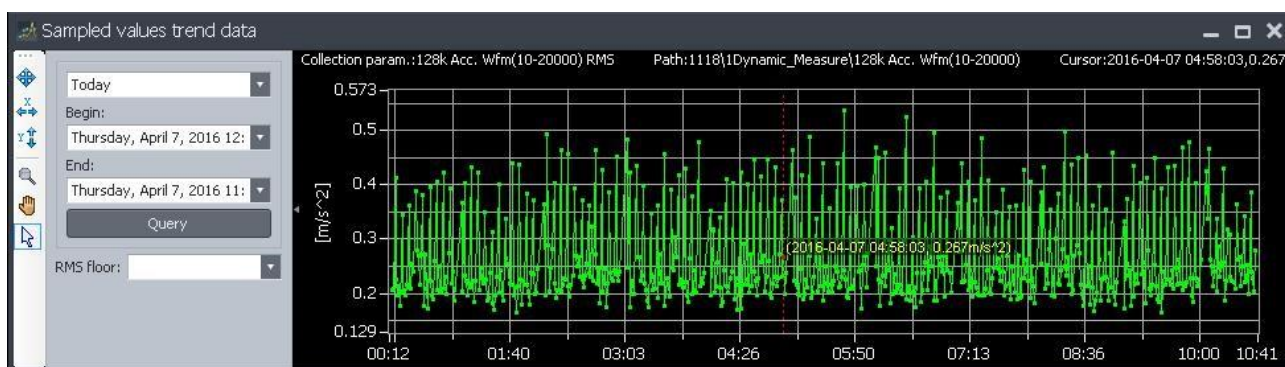
Open waterfall analysis window, select “waterfall analysis setting” from right click menu of long waveform, the setting window as following:



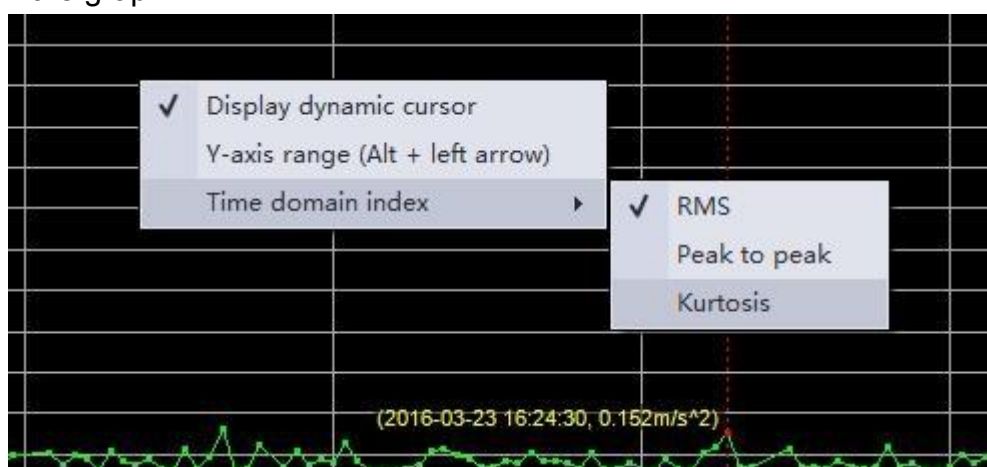
Users can select section data length, set time interval, click “waterfall plot”, to cut the long waveform into several bands according to the selected band length and time interval, the waterfall plot displays each band waveform data of cut.

4.2.6. Sampled Value Trend Data

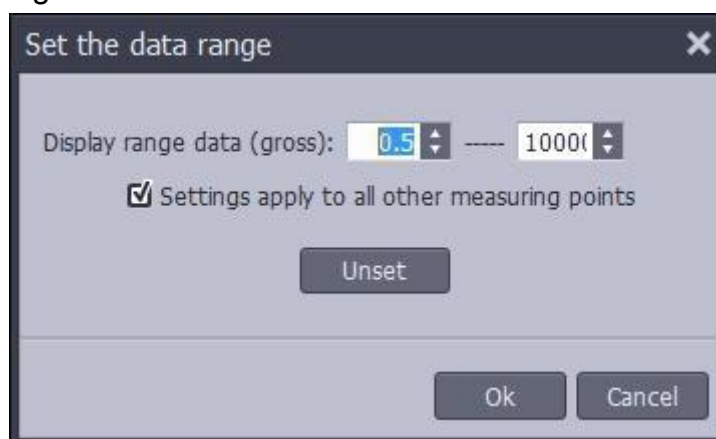
It is used to show the trend of sampling value through the first acceleration DAQ definition of each sensor. Sampling value includes: RMS, Peak to Peak value and Kurtosis value. Right click on the graph can exchange during these three items, the default display is RMS Trend.



Right click on the graph:

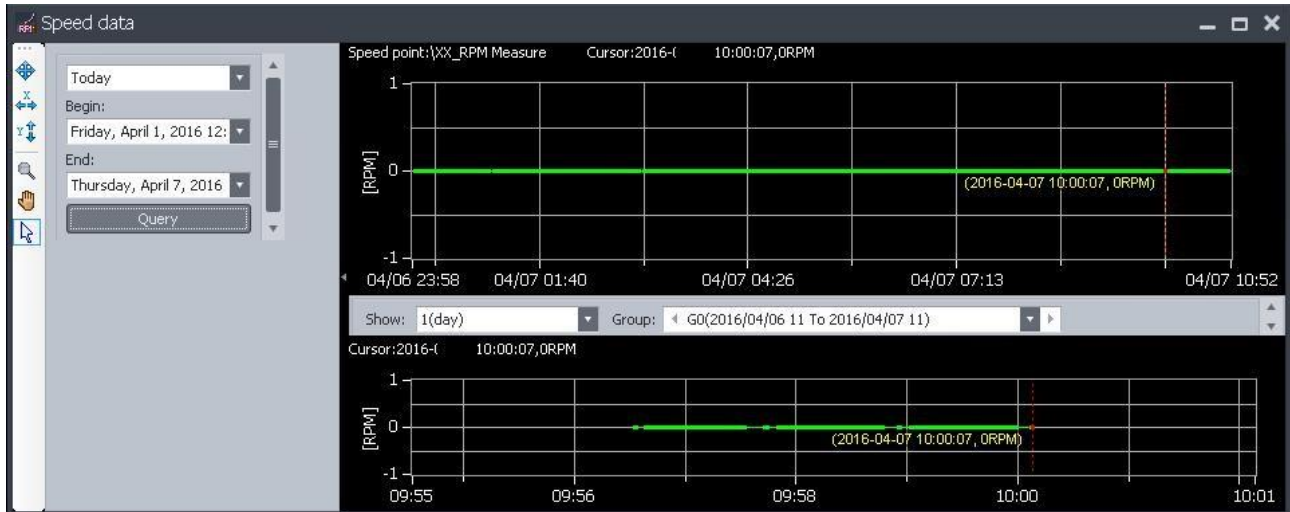


- Y-axis range (Alt + left arrow): when viewing RMS sampling trend, Y-axis range can be setup to show specific value; choose “settings apply to all other measuring points”, then this setting will be effective to all measuring points; choose “unset” will make this setting invalid.



4.2.7. Speed Data

This graph shows the historical equipment speed trend; it requires installing speed sensor and configuring RPM measurement point in the software. See as follow:



- Time range setting: on the left, the display time range should be set, click “Query” to see the speed data one the right in groups. “Show” means the time period of each group (maximum five days), “Group” means speed data of current time period. If the time range setting is very short time period, then on the right, click the data above, it will be amplified below.

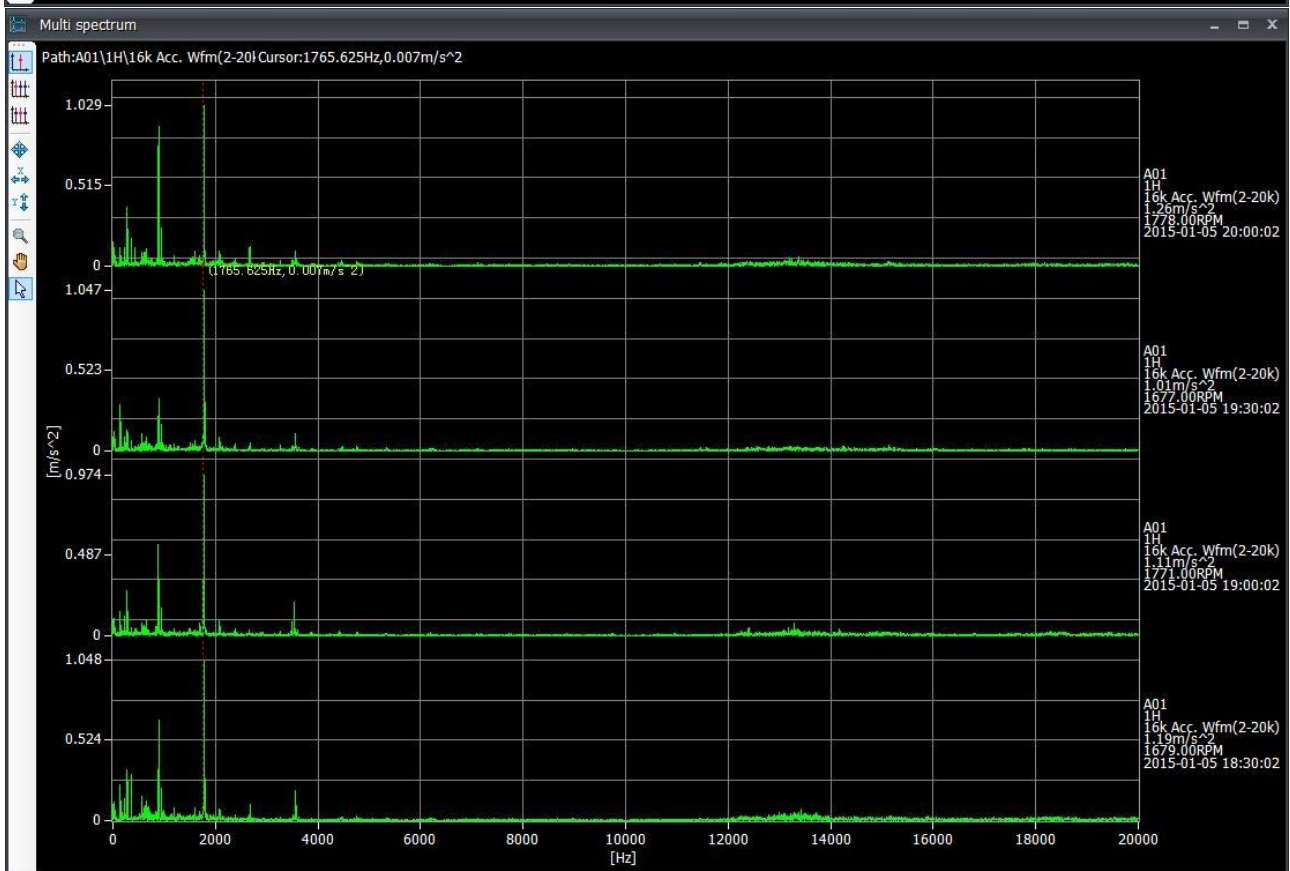
4.2.8. Long Waveform Trend

It shows the historical trend of long time waveform data. For VMS504, there will be several kinds of long time waveform according to different measurement strategy, see as follow: on the left, it will lists all kinds of long time waveform, choose one to see its trend on the right.



4.2.9. Multi Waveform, Multi Spectrum Analysis

The multi waveform and multi spectrum analysis are very flexible comparative analysis tools provided by system. They support the comparative analysis between any multi waveform and multi spectrum selected from database. Multi waveform can have many vibration data under the selected equipment displayed on one graph simultaneously.



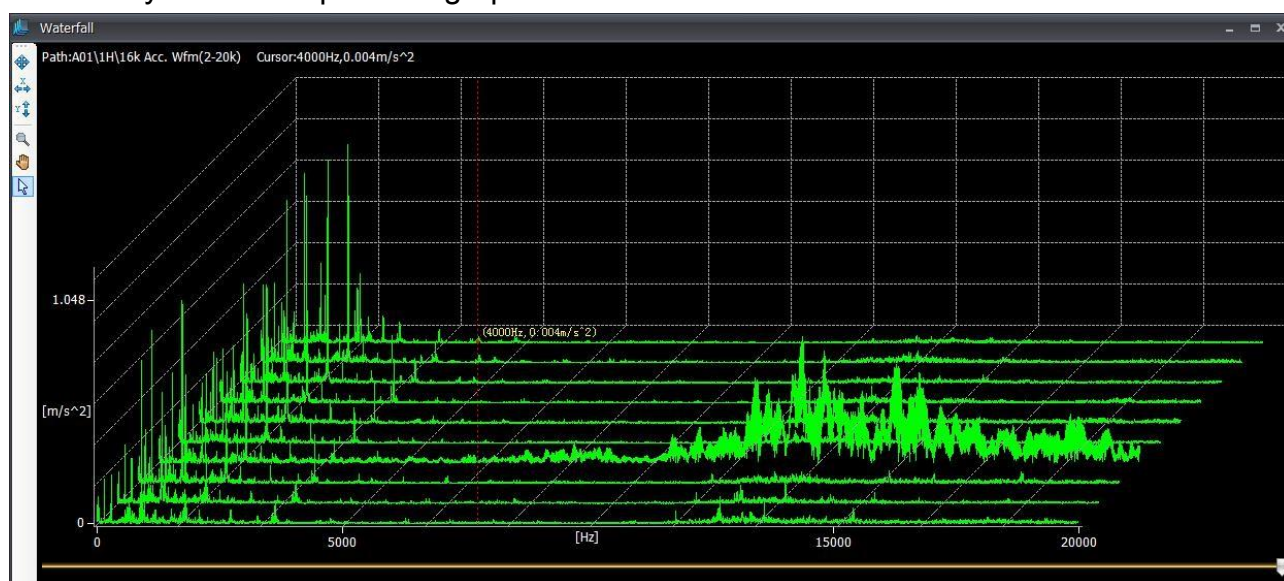
The multi waveform and multi spectrum graphs are included in the right click menu, besides those mentioned common operation, they also have the following functions:

- User-defined graph: when selected this, users can add any data to multi time domain or multi spectrum graphs from data list.
- Path display level: it's valid after selected "user-defined graph", when move mouse to "path display level", displays "equipment", "meas. point", and "meas. definition", when select different levels, the data route on the graphs will be displayed to corresponding levels accordingly.
- Clear graphs: only valid when select "user-defined graph" and delete all of the content displayed on current graph.
- Remove current graph: only valid when select "user-defined graph" and remove currently selected graphs.

4.2.10. Waterfall Plot

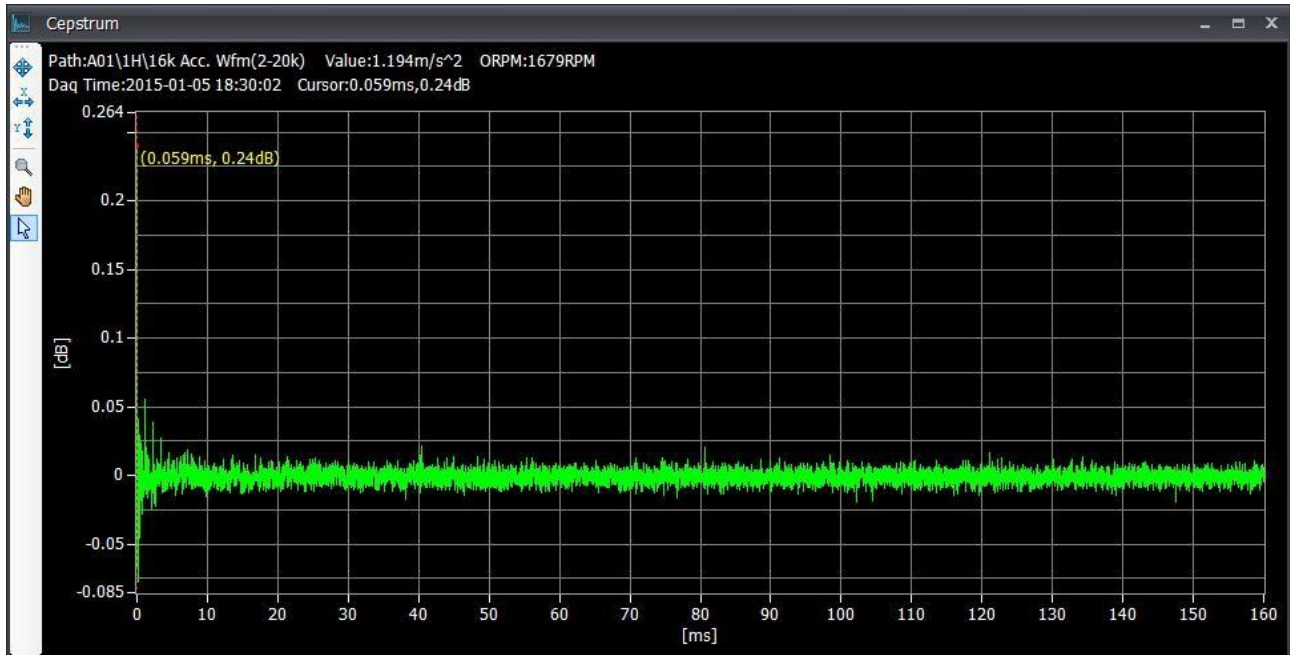
Waterfall plot displays the whole trend of spectrum graph, also called 3-D spectrum graph, and displays the spectrum of many data under one node in one graph as 3-D way. It

indicates the machinery's variation trend for the size of each frequency component of the vibration channels during a certain time; it's the 3-D spectrum graph which consists of the continually collected spectrum graphs.



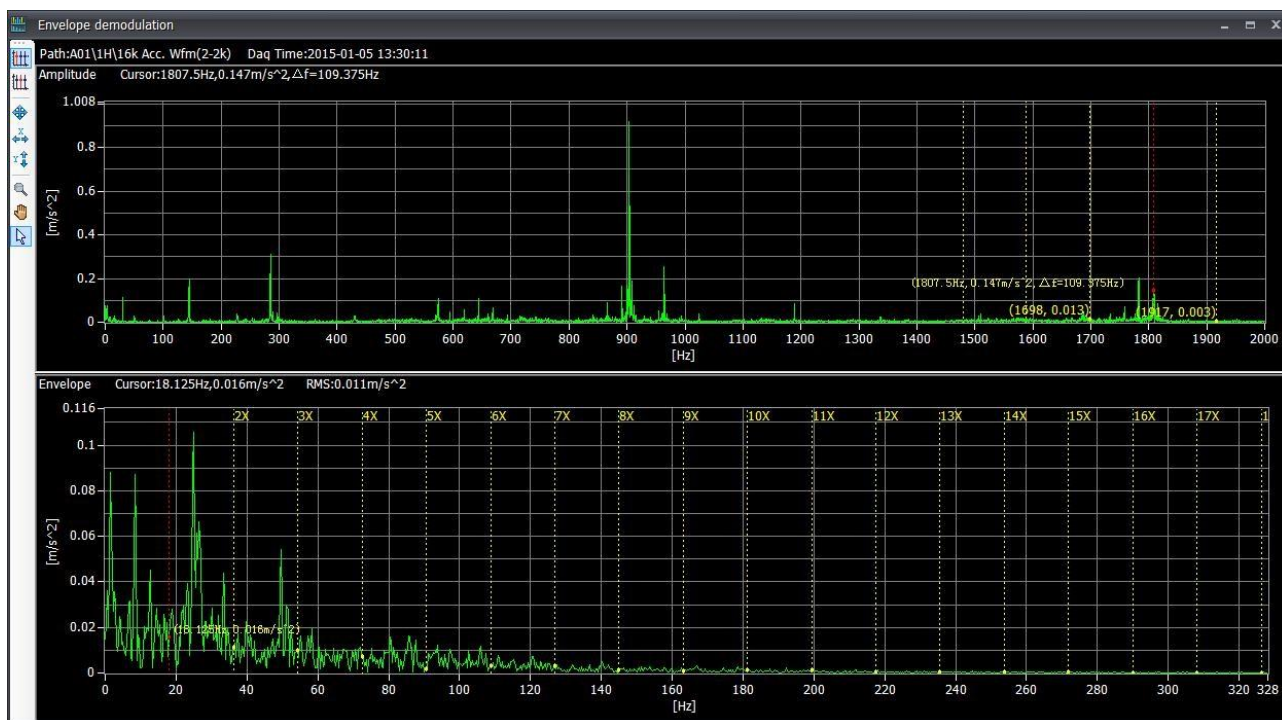
4.2.11. Cepstrum Analysis

Cepstrum analysis is also called the second spectrum analysis, it can help users to detect and isolate the periodic component of complicated spectrum graph clearly, include side frequency band and harmonic frequency, it also can extrude some small signal of periodic.



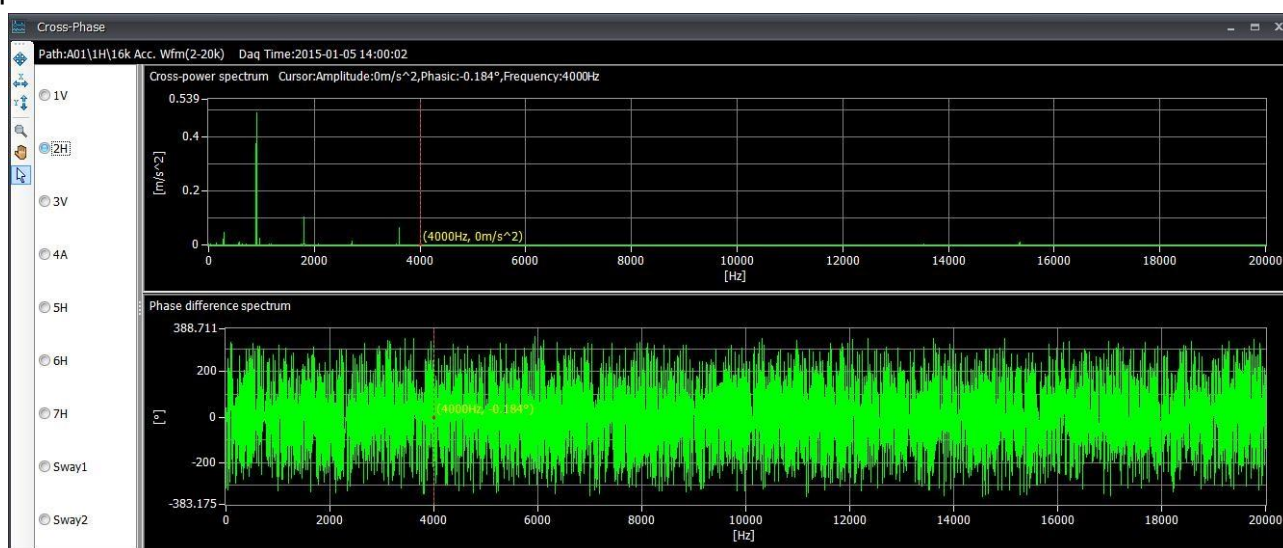
4.2.12. Envelop Demodulation

Envelop demodulation (also called resonant demodulation) can be used for initial bearing faults diagnosis of bearing components. It uses the resonant of bearing base, bearing components or sensors caused by the surface damage of bearing components; it's performed as spectrum peaks of high frequency band on the spectrum graph, while the faults characteristic frequency will be modulated on these high natural frequency.



4.2.13. Cross Phase

It is used to analyze the data collected by dual-channel; the top is cross-power spectrum, while the bottom is phase differences spectrum. The cross-power spectrum provided signal energy size distributed by frequency and correlations between two signals. The phase differences spectrum provided phase differences of each frequency component between two signals; it is used for assistant diagnosis. During actual operation we usually concern about the phase differences on 1X.

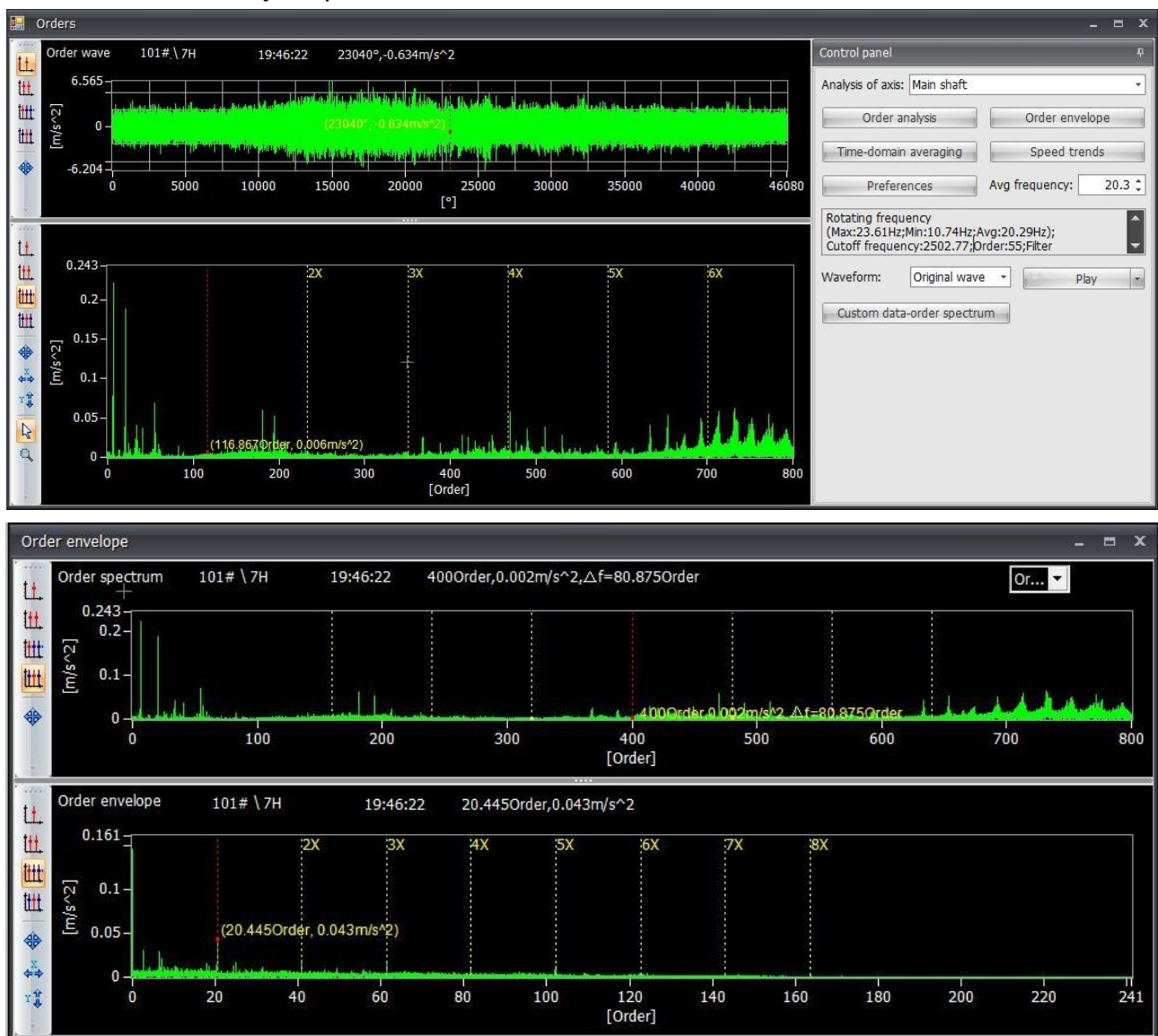


4.2.14. Order Analysis and Order Envelop

As for the variable speed machine, the vibration and noisy signal frequency will be changed along with the RPM, Order tracking can have variable signal frequency sampling according to the frequency changes.

The advantages of Order tracking:

- ◆ Clearer frequency
- ◆ Greater accuracy amplitude



4.2.15. Waveform Reprocessing

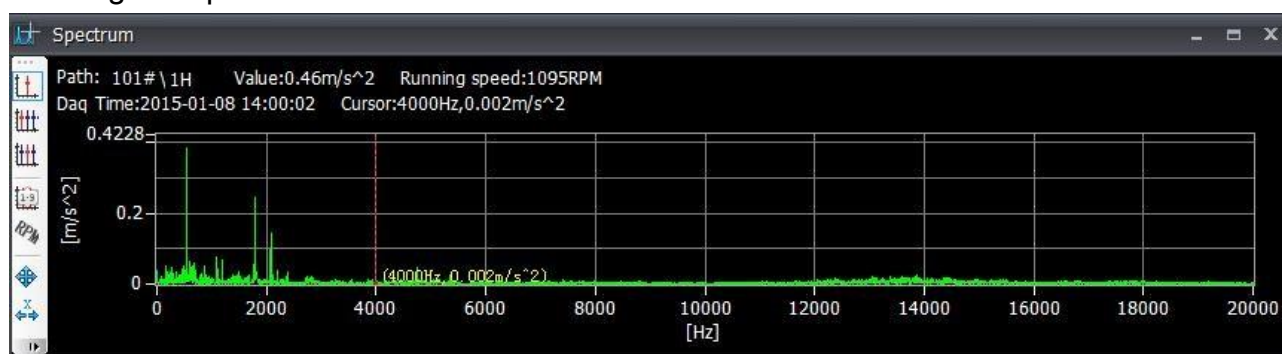
It can be used to make filtering processing for long waveform. Filtering processing has these kinds: Low pass, Band pass, High pass and so on. With this analysis tool, it can show more obvious data periodicity, the defect characteristic of bearings and gears in low speed can be detected easily;

Please check the following comparison of original waveform and spectrum and Reprocessing waveform and spectrum:

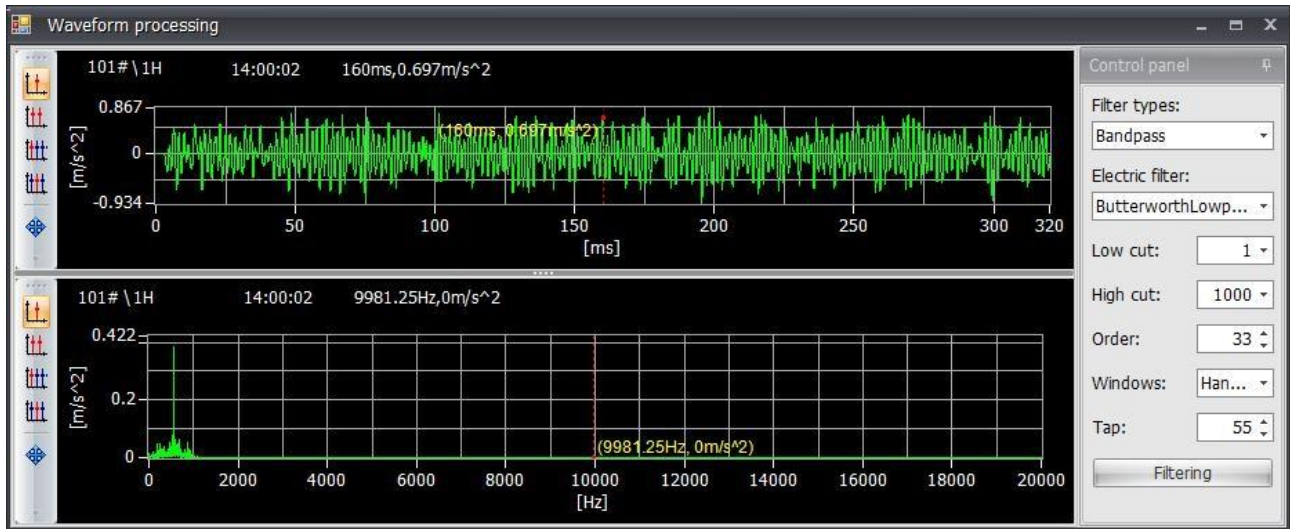
Original Waveform:



Original Spectrum:



Waveform Reprocessing:

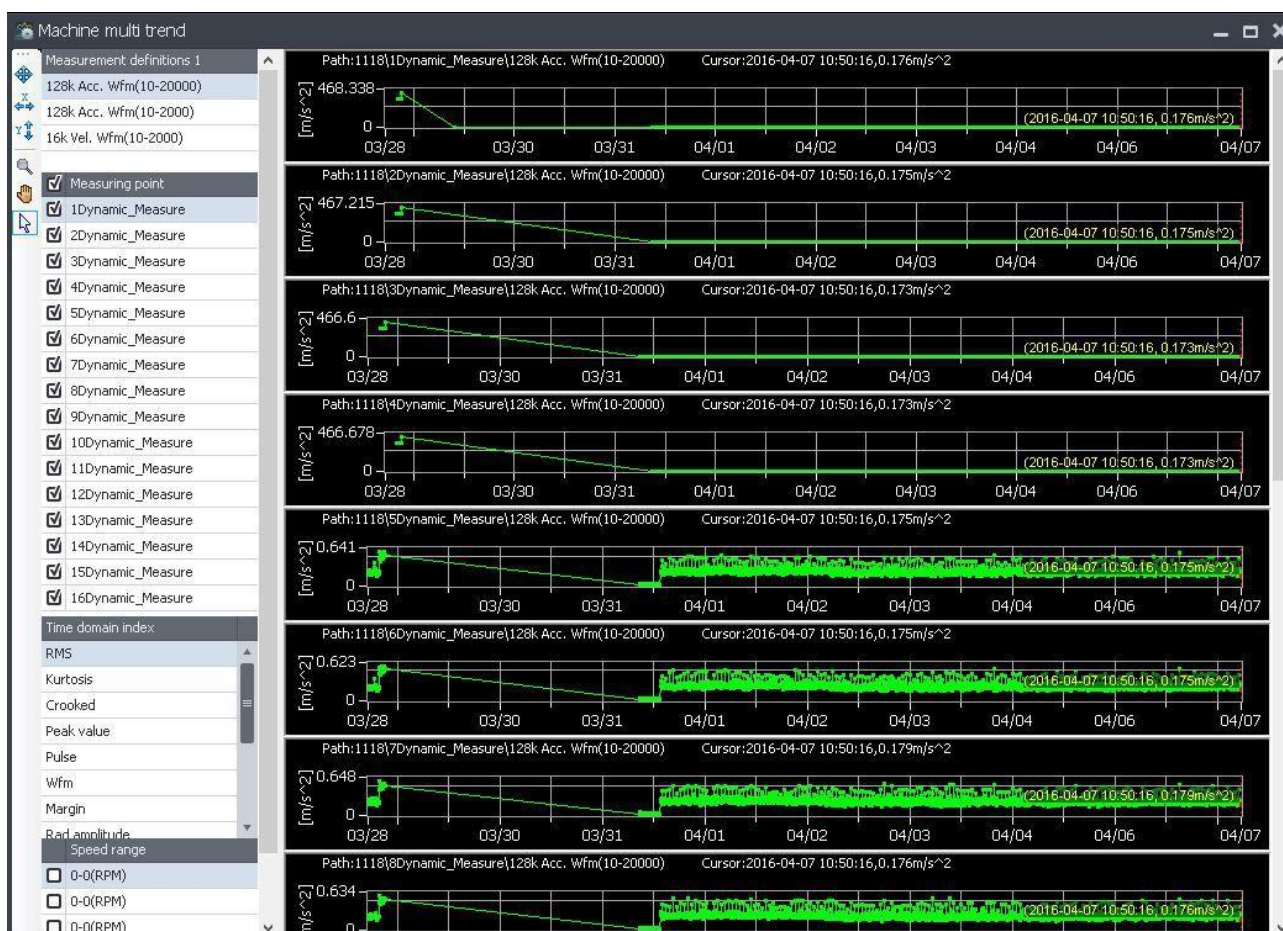


4.2.16. Monitor index trend

It will be available in the future.

4.2.17. Machine Multi Trend

It shows the trend of all measuring points of the equipment with different DAQ definition, see as follow:



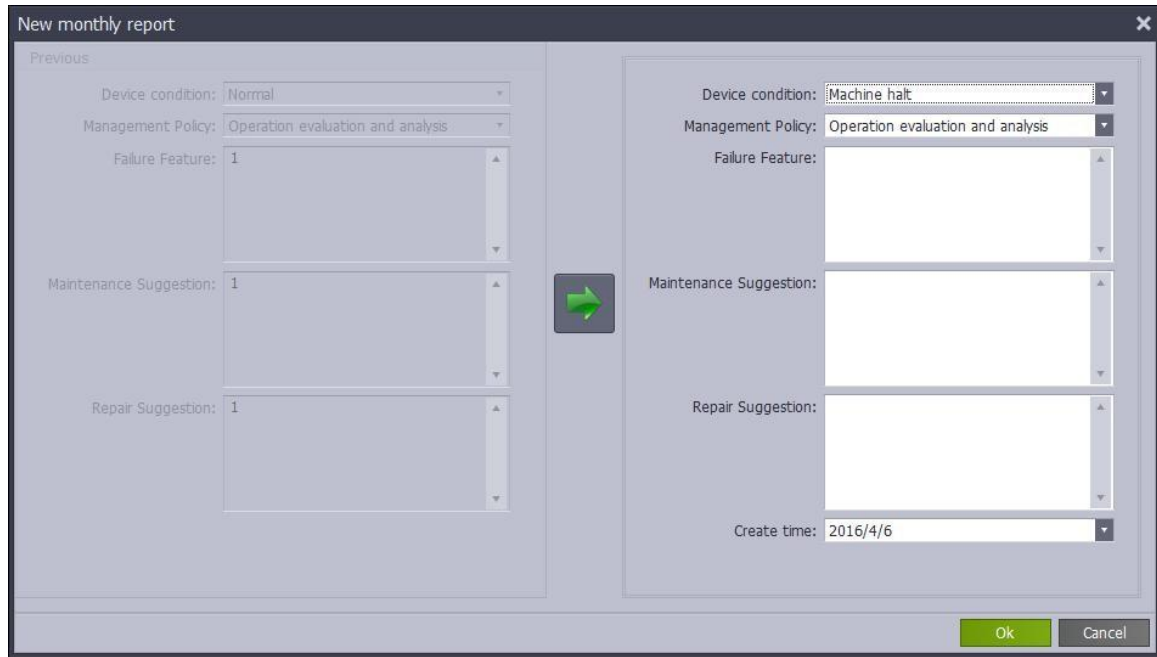
- On the left, it shows all measuring points and their DAQ definitions; choose one DAQ definition to see its trend on the right.
- Time domain index: it can be setup to see different trend: RMS, Peak value, Kurtosis and so on.
- Speed Range: for variable speed equipment, there will be several speed ranges, choose one speed range to see its specific range.

4.3. Medical report

It is used for vibration analysts to give report periodically.

“Diagnostic Analysis”---chooses equipment, and then click “Medical report” on the right part.

In the new window, click “New” to open report, see as follow:



Vibration analysts can also edit the previous report by click “Edit”.

4.4.Diagnostic report

Besides medical report (or monthly report), vibration analysts can also upload diagnostic report in other 当 formats(for example, when the equipment has a failure, vibration analysts may give a diagnostic report to explain the failure details).

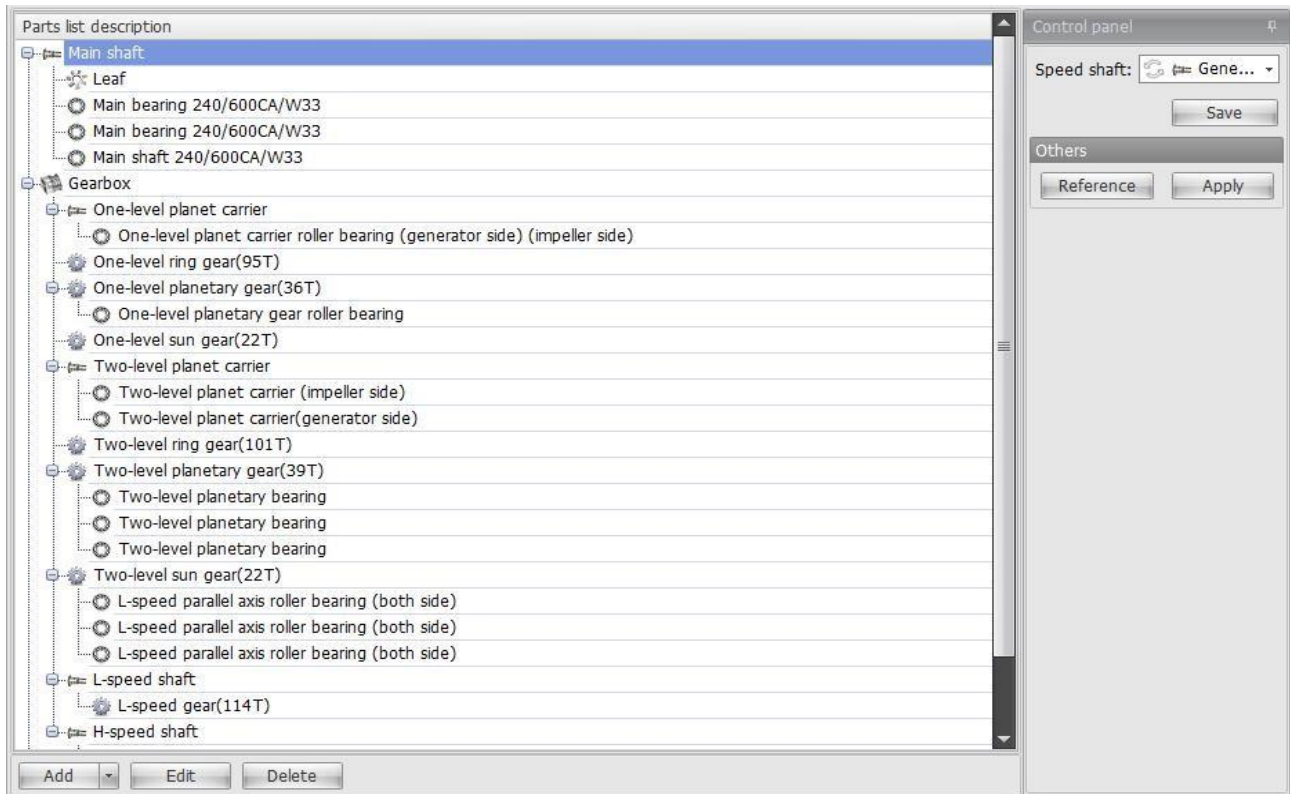
“Diagnostic Analysis”---chooses equipment, and then click “Diagnostic report” on the right part.

In the new window, click “New” to upload report or other files.

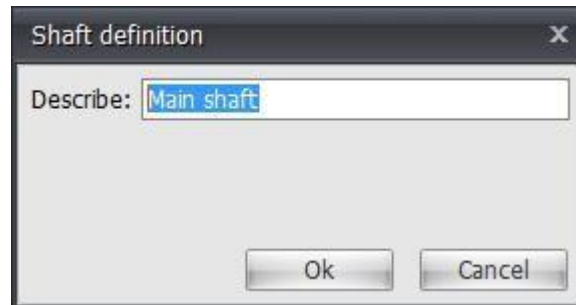
4.5.Equipment Parts Construction

Equipment Part Construction is the conclusion of the monitored parts list (Bearing, gear, shaft, Leaf Blade), in order to descript the relationship of each parts and the whole equipment condition. It is also a preparation for the later calculation of frequency, gear engagement characteristic and bearing characteristic. Speed sensor should be marked for the specific shaft. Equipment Parts Construction includes the following parts: Parts List
Description: User should configure only one equipment parts construction if

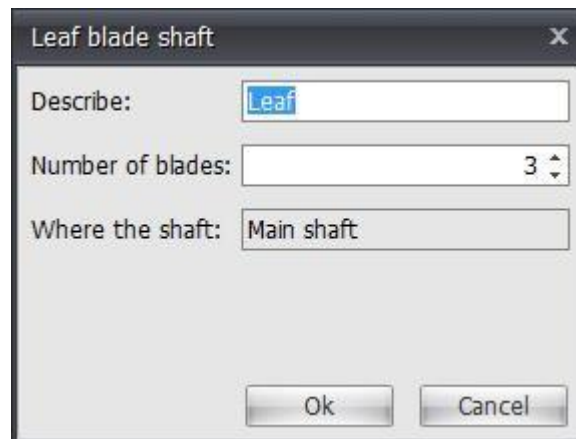
having several similar equipment, because it can be applied for the same type equipment.



Add shaft:



Add Leaf Blade shaft:



Bearing on the shaft:

Bearing on the shaft

Manufacturer:

skf

Choose a different bearing...

Model:

240/600CA

Number of roller:

28

Describe:

Main bearing 240/600CA/W33

Shaft:

Main shaft

Authenticity:

Deter...

Bearing data:

Size

Inner diameter:

Outer diameter:

Width:

Failure frequency parameter

BPFO:

12.744

BPFI:

15.256

FTFI:

0.545

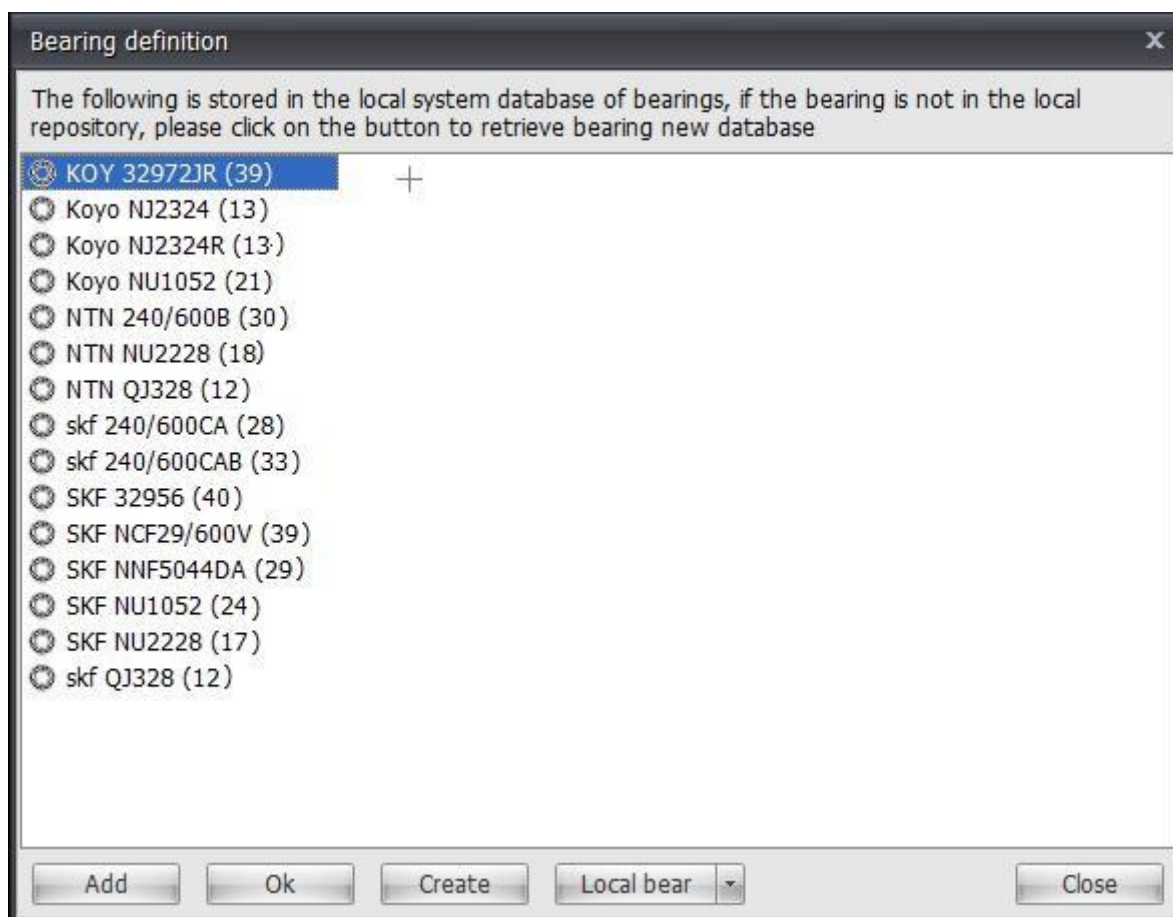
BSF:

5.434

OK

Cancel

Add Bearing / Bearing definition (Choose from local bearing):



Bearing Database:

Bearing database

Manufacturer: Model:

Manufa...	Model	Number of r...	BPFO	BPFI	FTFO	FTFI	BSF
barden	120_H	22	9.651	12.349	439	438	3.878
barden	122_H	20	8.631	11.369	0.432	0.568	3.463
barden	124_H	21	9.159	11.841	0.436	0.564	3.719
barden	126_H	20	8.653	11.347	0.433	0.567	3.52
barden	200_H	23	8.478	14.522	0.369	0.631	1.711
barden	201_H	9	3.348	5.652	0.372	0.628	1.763
barden	202_H	10	3.773	6.227	0.377	0.623	1.849
barden	203SST	7	3.085	4.195	0.386	0.614	2.002
barden	203_H	10	3.993	6.007	0.399	0.601	2.3
barden	204SST	8	3.104	4.896	0.388	0.612	2.021
barden	204_H	10	3.863	6.137	0.386	0.614	2.015
barden	205_H	11	4.406	6.594	0.401	0.599	2.332
barden	206SST	9	3.618	5.382	0.402	0.598	2.333
barden	206_H	11	4.315	6.685	0.392	0.608	2.137
barden	207_H	12	4.803	7.197	0.4	0.6	2.324
barden	208_H	12	4.852	7.148	0.404	0.596	2.431
barden	209_H	13	5.357	7.643	0.412	0.588	2.662
barden	2100_H	9	3.42	5.58	0.38	0.62	1.78

Record 1 of 100

Edit Local Bearing:

Bearing

Manufacturer: Model:

Fault frequency/internal dimensions **External dimensions**

Number of roller:

Diameter of roller:


Pitch diameter:

Contact angle:

BPFO: BPFI:

FTFO: FTFI:

BSF:



Add NGW Planet Gear(NW):

NGW

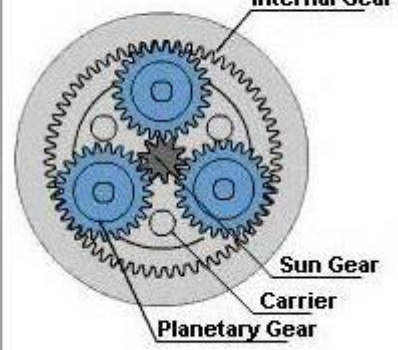
The gearbox:

One-level planet carrier Number:

One-level ring gear Teeth:

One-level planetary gear Teeth:

One-level sun gear Teeth:



Add Parallel axis system:

Parallel axis system

The gearbox:

	Follower			Drive wheel		
	Describe	Shaft	Teeth	Describe	Shaft	Teeth
> 1				L-speed gear	L-speed shaft	114
2	H-speed gear	H-speed shaft	30			

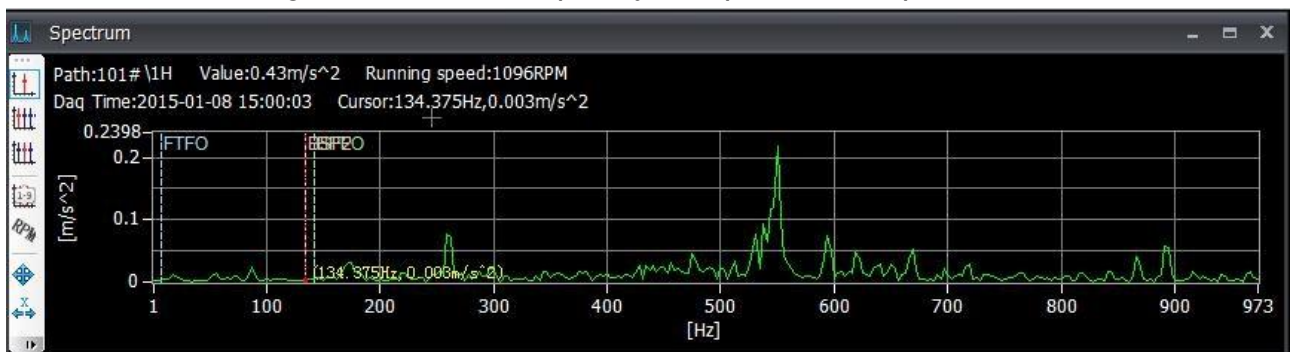
4.6. Equipment Characteristic Frequency

According to the constructed equipment parts information and collected equipment frequency, to calculate the parts frequency information (Frequency, Gear Engagement frequency, fault frequency, bearing characteristic frequency), display the given equipment characteristic frequency. It can also input recalculated characteristic frequency, searching the specific frequency from characteristic frequency and mark characteristic frequency on the graph.

Equipment Characteristic Frequency:

Describe	Frequency	Describe	Model	BPFO	BPFI	FTFO	FTFI	BSF	2*BSF
Main shaft	0.162	H-speed shaft							
Leaf	0.485	Accelerate ...	NTN NU2228 (18...	142.480	186.320	7.909	10.357	67.276	134.552
One-level planet carrier	0.162	Accelerate ...	SKF NU2228 (17...	134.625	175.908	7.855	10.412	67.221	134.443
One-level ring gear(95T)(...	0.485	H-speed shaft	NTN QJ328 (12个)	89.050	130.150	7.416	10.850	40.716	81.433
One-level planetary gear(3...	0.427	H-speed shaft	skf QJ328 (12个)	90.164	129.036	7.508	10.759	40.881	81.762
One-level planetary gear(3...	15.359	H-speed shaft	fag/stamford NU...	141.147	187.653	7.836	10.430	63.276	126.551
One-level planetary gear(3...	0.853	H-speed shaft	fag/stamford NU...	141.147	187.653	7.836	10.430	63.276	126.551
One-level sun gear(22T)(...	2.094	H-speed shaft	Koyo NU2230R (...	149.056	198.011	7.855	10.412	63.203	126.405
Two-level planet carrier	0.860	H-speed shaft	Koyo NU2230 (1...	142.480	186.320	7.855	10.412	67.221	134.443
Two-level ring gear(101T)...	2.579	Main shaft							
Two-level planetary gear(3...	2.227	Main bearin...	skf 240/600CA (...	2.060	2.466	0.074	0.088	0.879	1.757
Two-level planetary gear(3...	86.839	Main bearin...	NTN 240/600B (...	2.225	2.625	0.074	0.087	0.959	1.918
Two-level sun gear(22T)(...	11.842	Main shaft 2...	skf 240/600CAB ...	2.429	2.906	0.074	0.088	0.881	1.763
L-speed shaft	4.807	One-level planet carrier							
		One-level pl...	SKF NCF29/600V...	2.900	3.405	0.074	0.087	1.001	2.001
		One-level planetary gear(36T)							
		One-level pl...	SKF NNF5044DA ...	5.521	6.852	0.192	0.235	1.958	3.916
		Two-level planet carrier							
		Two-level pl...	KOY 32972JR (3...	15.648	17.884	0.402	0.458	6.157	12.314
		Two-level pl...	KOY 32972JR (3...	15.648	17.884	0.402	0.458	6.157	12.314
		Two-level planetary gear(39T)							
		Two-level pl...	Koyo NJ2324 (13...	11.734	17.212	0.913	1.314	5.656	11.311
		Two-level pl...	Koyo NJ2324 (13...	11.734	17.212	0.913	1.314	5.656	11.311

Mark the bearing characteristic frequency on Spectrum Graph:



4.7. Correspondence of DAQ points and Equipment parts

Correspond to the collected data and equipment parts, in order to make a preparation for the calculation of DAQ index.

Correspond relation table of measure point component

Measure point name	Correspond component's name
> Main bearing 1H	Main shaft
Main bearing 1A	Main shaft
One level planet wheel 2H	Planetary
	Sun shaft
One level planet wheel 2V	Planetary
	Sun shaft
	Middle shaft
	High speed shaft
Gear box in the middle level 3A	Sun shaft
	Middle shaft
	High speed shaft
High speed shaft 4H	Middle shaft
	High speed shaft
Coupling lateral bearing 5H	Generator
Collector ring side bearing 6H	Generator

Edit Close

4.8. Equipment Operating Condition Configuration

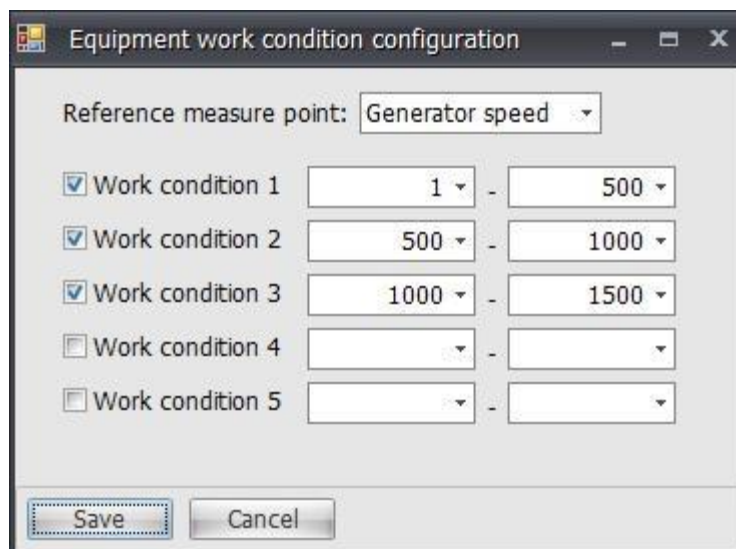
Operating Condition: it shows operating condition under loading, the system divides it into five kinds. "Apply": click to make it effective for the same type equipment.

Enterprise equipment work condition configuration

Equipment name	Reference point	Work conditon 1	Work conditon 2	Work conditon 3	Work conditon 4	Work conditon 5
> A01	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 500
A02	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
A03	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
A04	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
A05	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
A06	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B01	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B02	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B03	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B04	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B05	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B06	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B07	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B08	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B09	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700
B10	Generator speed	<input checked="" type="checkbox"/> 0	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 100	<input checked="" type="checkbox"/> 500	<input checked="" type="checkbox"/> 700

Save Apply Cancel

Equipment Operating Condition Configuration: Configure and view for individual equipment



Equipment work condition configuration

Reference measure point: Generator speed

☒ Work condition 1 1 - 500

☒ Work condition 2 500 - 1000

☒ Work condition 3 1000 - 1500

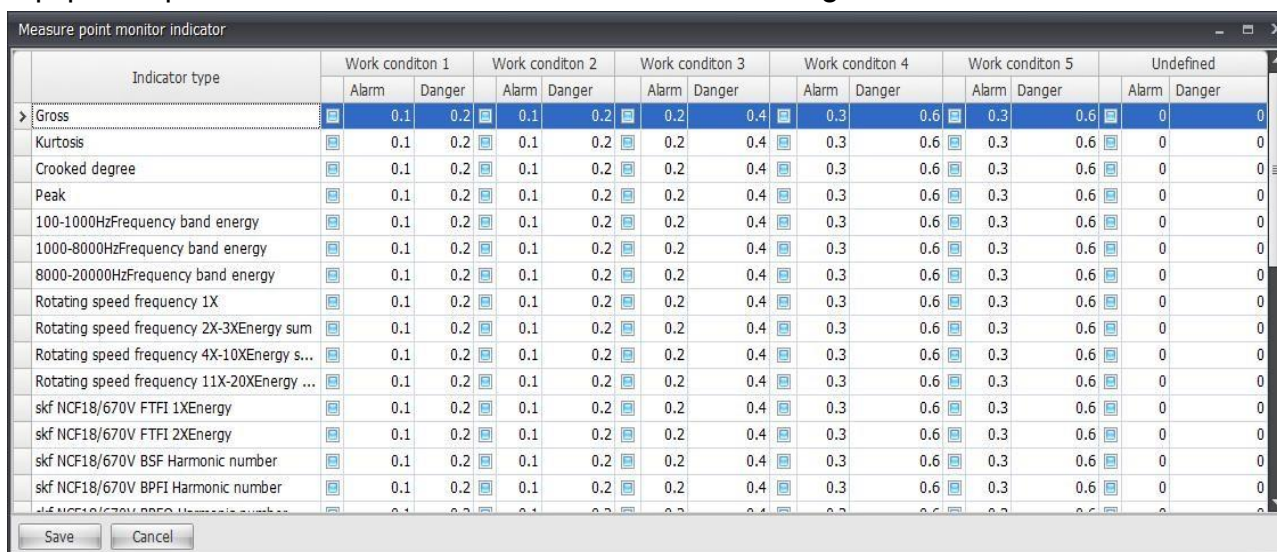
☐ Work condition 4 - -

☐ Work condition 5 - -

Save Cancel

4.9.DAQ point Index Alarm Setting

System will calculate the vibration index for the added equipment parts to monitor its change. After finishing DAQ point index alarm setting, system will monitor the vibration index for each equipment parts. It has two kinds of alarm: alarm and dangerous.



Indicator type	Work condition 1		Work condition 2		Work condition 3		Work condition 4		Work condition 5		Undefined	
	Alarm	Danger	Alarm	Danger	Alarm	Danger	Alarm	Danger	Alarm	Danger	Alarm	Danger
Gross	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Kurtosis	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Crooked degree	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Peak	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
100-1000HzFrequency band energy	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
1000-8000HzFrequency band energy	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
8000-20000HzFrequency band energy	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Rotating speed frequency 1X	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Rotating speed frequency 2X-3XEnergy sum	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Rotating speed frequency 4X-10XEnergy s...	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
Rotating speed frequency 11X-20XEnergy ...	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
skf NCF18/670V FTFI 1XEnergy	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
skf NCF18/670V FTFI 2XEnergy	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
skf NCF18/670V BSF Harmonic number	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
skf NCF18/670V BPF Harmonic number	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0
skf NCF18/670V BPF Harmonic number	0.1	0.2	0.1	0.2	0.2	0.4	0.3	0.6	0.3	0.6	0	0

Save Cancel

4.10. Alarm Incident Management

Query the alarm incident and relevant proceeding results.

Alarm event management							
Begin time: 2015年1月4日 11:52		Ent time: 2015年1月5日 0:00		Query			
Collect time	Path	Type	Level	Result	Operator	Processing time	
2015-1-05 05:30:02	B03/Bearing of main shaft 1H/16k Acceleration waveform(10-20k)	Gross	Warning	Have treatment	Admin	2015-1-05 10:30:02	
2015-1-04 06:20:01	B03/Bearing of main shaft 1H/16k Acceleration waveform(10-20k)	Kurtosis	Warning	Have treatment	Admin	2015-1-05 13:20:06	
2015-1-03 07:10:02	B03/Bearing of main shaft 1H/16k Acceleration waveform(10-20k)	Peak	Alarming	Have treatment	Admin	2015-1-04 14:10:30	
> 2015-1-02 05:30:02	B03/Bearing of main shaft 1H/16k Acceleration waveform(10-20k)	Gross	Warning	Have treatment	Admin	2015-1-03 10:30:02	
2015-1-01 06:20:01	B03/Bearing of main shaft 1H/16k Acceleration waveform(10-20k)	Kurtosis	Alarming	Have treatment	Admin	2015-1-02 13:20:06	

4.11. Alarm Confirmation

For these alarm data, analysis engineer should deal with then and confirm its status: Valid alarm, Undetected Error Signal, Unreasonable Threshold value, outrange, Operating Condition fluctuation, Detected Error Signal, Unknown Alarm.

Alarm confirm

Collect Time	Path	Alarm Type	Alarm level
Enterprise: Anhui Petrochemical			
2014-12-10 12:10	1301\1H\16k Acceleration waveform(10-20k)	Vibration transfinite	4
2014-12-10 12:10	1201\1H\16k Acceleration waveform(10-20k)	Vibration transfinite	4
2014-12-10 12:10	1001\1H\16k Acceleration waveform(10-20k)	Vibration transfinite	4
2014-12-10 12:10	1001\1H\16k Acceleration waveform(10-20k)	Vibration transfinite	4
Enterprise: Yumengchangma of Zhongjieneng Wind Power			
2014-12-10 12:10	A03\1H\16k Acceleration waveform(10-20k)	Vibration transfinite	4
2014-12-10 12:10	A01\1H\16k Acceleration waveform(10-20k)	Vibration transfinite	4

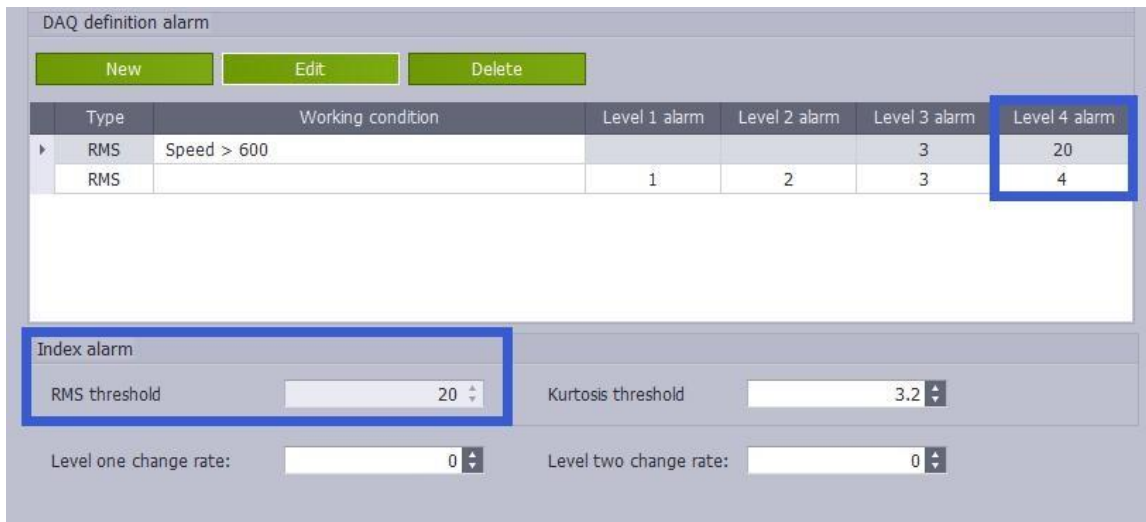
Confirm State: Valid alarm Confirm

4.12. Alarm Threshold Setting

It should be setup in “Diagnostic analysis” interface.

Note: The threshold of sampling value (acceleration) will be generated automatically, and it is the same with level 4 threshold of DAQ definition alarm. If there is more than one DAQ

definition alarm threshold, then the bigger one of level 4 thresholds should be the threshold of sampling value.



DAQ definition alarm

New Edit Delete

Type	Working condition	Level 1 alarm	Level 2 alarm	Level 3 alarm	Level 4 alarm
RMS	Speed > 600			3	20
RMS		1	2	3	4

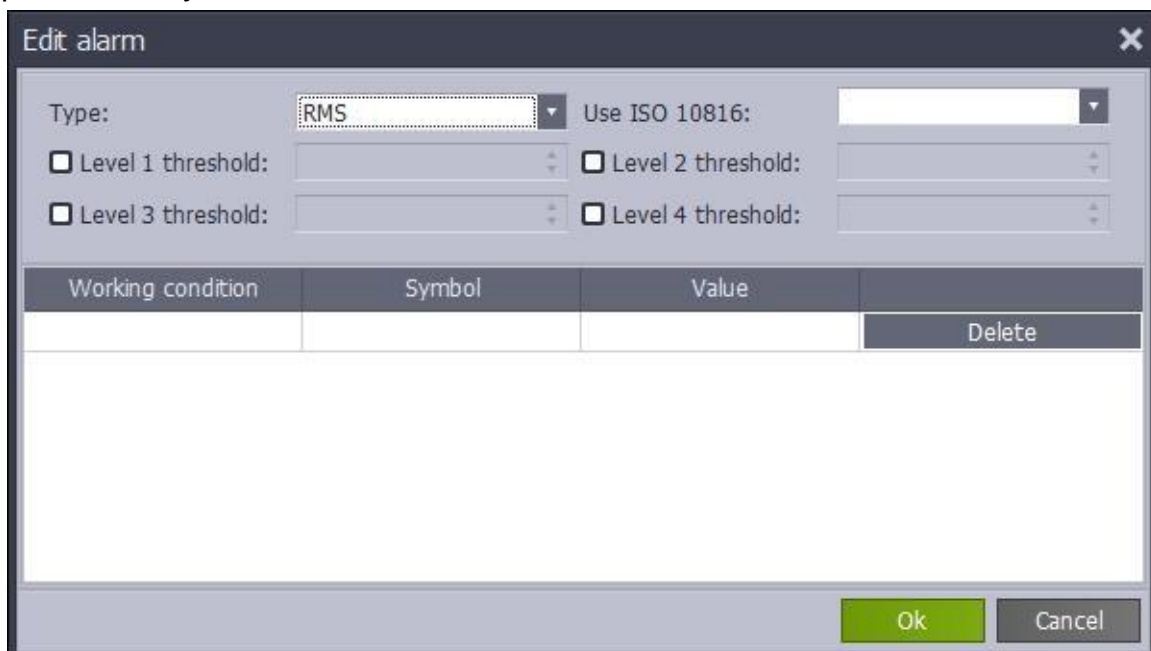
Index alarm

RMS threshold: 20 Kurtosis threshold: 3.2

Level one change rate: 0 Level two change rate: 0

4.12.1. Threshold setting

In “Diagnostic analysis” interface, choose one DAQ definition on the left, then the threshold setting can be made on the right, click “New” and see as follow ; RMS and kurtosis threshold can be setup here, ISO10816 can be used for your reference, working condition can also be setup if necessary.



Edit alarm

Type: RMS Use ISO 10816:

☐ Level 1 threshold: ☐ Level 2 threshold:

☐ Level 3 threshold: ☐ Level 4 threshold:

Working condition	Symbol	Value	Delete

Ok Cancel

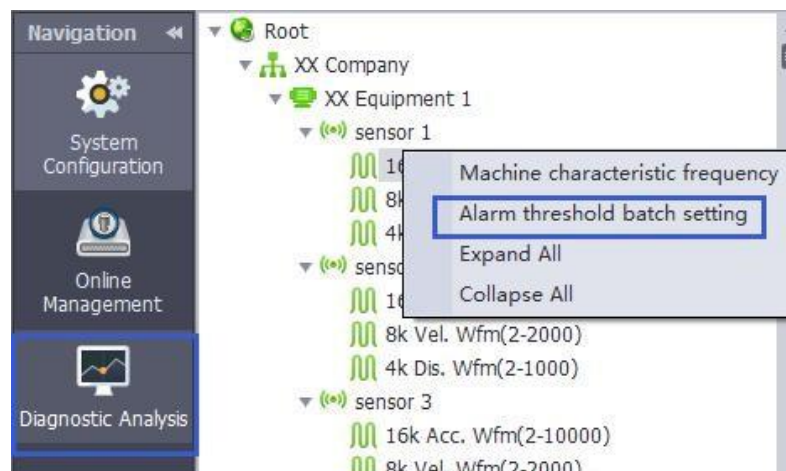


4.12.2. Automatic generation of alarm threshold

It will be available in the future.

4.12.3. Alarm threshold batch setting

If there are many measuring points, user has no need to setup one by one as before. In “Diagnostic analysis” interface, right click on the configuration tree to click “alarm threshold batch setting”, see as follow:



Then threshold can be setup in the coming windows, or export to edit it, then import it again.

Each time, system will make a copy of threshold setting in “C:\IOMP\127.0.0.1\AlarmHistory”.

Alarm threshold batch setting

Measuring point route	Working condition	Type	Level 1 alarm	Level 2 alarm	Level 3 ...	Level 4 al...
Root/XX Company/XX Equipment 1/sensor 1/16...						
Root/XX Company/XX Equipment 1/sensor 1/8k ...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 1/4k ...						
Root/XX Company/XX Equipment 1/sensor 2/16...						
Root/XX Company/XX Equipment 1/sensor 2/8k ...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 2/4k ...						
Root/XX Company/XX Equipment 1/sensor 3/16...						
Root/XX Company/XX Equipment 1/sensor 3/8k ...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 3/4k ...						
Root/XX Company/XX Equipment 1/sensor 4/16...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 4/8k ...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 4/4k ...						
Root/XX Company/XX Equipment 1/sensor 5/16...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 5/8k ...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 5/4k ...						
Root/XX Company/XX Equipment 1/sensor 6/16...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 6/8k ...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 6/4k ...						
Root/XX Company/XX Equipment 1/sensor 7 /16...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 7 /8k...		RMS	0.01	0.02	0.03	0.04
Root/XX Company/XX Equipment 1/sensor 7 /4k...						
Root/XX Company/XX Equipment 1/sensor 8 /16...		RMS	0.01	0.02	0.03	0.04

Export Import *Attention: after importing Excel and saving, original record will be deleted. ! e

4.13. Monitoring mode

In “Diagnostic analysis” interface, click “” in top right corner to have monitoring mode.

In this window, signal type can be change via right clicking.

Monitoring mode				
Measuring point	RMS (Vel.)		Alarm level	Temperature
Temperature alarm level				
▼ 113				
1Dynamic_Measure	53.921 in/s	✓ Vel.	4level_alarm	
2Dynamic_Measure	53.868 in/s	Dis.	4level_alarm	
3Dynamic_Measure	53.900 in/s	Vol.	4level_alarm	
4Dynamic_Measure	53.916 in/s	Cur.	4level_alarm	
5Dynamic_Measure	0.085 in/s		4level_alarm	
6Dynamic_Measure	0.085 in/s		4level_alarm	
7Dynamic_Measure	0.086 in/s		4level_alarm	
8Dynamic_Measure	0.086 in/s		4level_alarm	
9Dynamic_Measure	0.089 in/s		4level_alarm	
10Dynamic_Measure	0.088 in/s		4level_alarm	
11Dynamic_Measure	0.088 in/s		4level_alarm	
12Dynamic_Measure	0.088 in/s		4level_alarm	
13Dynamic_Measure	0.088 in/s		4level_alarm	
14Dynamic_Measure	0.088 in/s		4level_alarm	
15Dynamic_Measure	0.088 in/s		4level_alarm	
16Dynamic_Measure	0.088 in/s		4level_alarm	
hd01	0.020 in/s			
hd02	0.029 in/s			
hd03	0.020 in/s			
hd04	0.021 in/s			
XX_Process information Mea...	0.000 Kg			
XX_RPM Measure	2400.900 RPM			
▼ 107				
1Dynamic_Measure	2.852 in/s		4level_alarm	
2Dynamic_Measure	3.068 in/s		4level_alarm	
3Dynamic_Measure	2.847 in/s		4level_alarm	

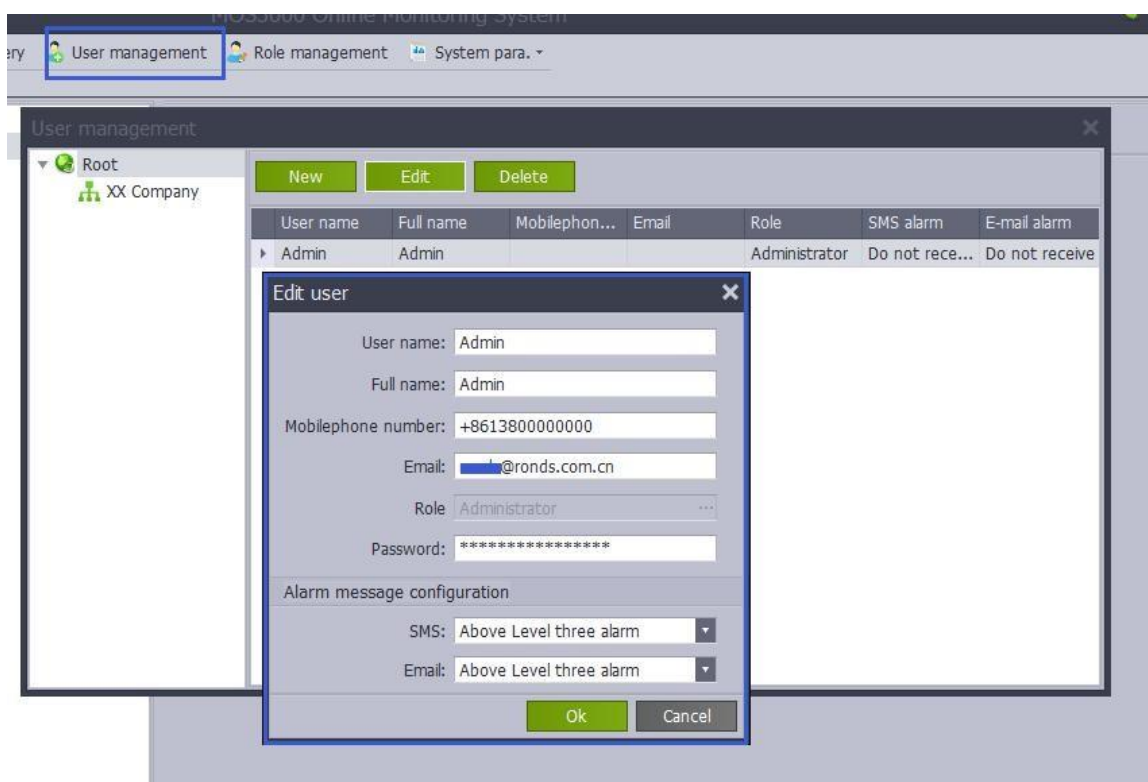
6.Others

6.1.Data size management

VibAnalyser5000 will manage the data size automatically based on 90 days, 180 days, 360 days and 720 days.

6.2.Alarm notification

VibAnalyser5000will send alarm email or SMS if there is alarm for DAQ definition, user information should be setup as follow:



Note: please make sure that SMS modular or Email alarm information has been setup correctly on “VIB5000 System config tools”.

