



# Machinery Condition Monitorin Solution

**CMS** **DNV·GL**

Anhui RONS Science & Technology Incorporated Company  
March, 2017

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A decorative graphic at the bottom right of the page, consisting of several overlapping, curved blue shapes that resemble a stylized wave or a modern architectural element.

# 1 **RONDS Introduction**



## Who are we?

### ➤ Where are we?

RONDS was first founded in Shanghai in 2004, moved to Hefei in 2007, 11 years history.

### ➤ What we have?


RONDS product line contains accelerometers, portable vibration analyzers, and online condition monitoring system. With these products, we can provide complete machine condition monitoring solution for different industries.

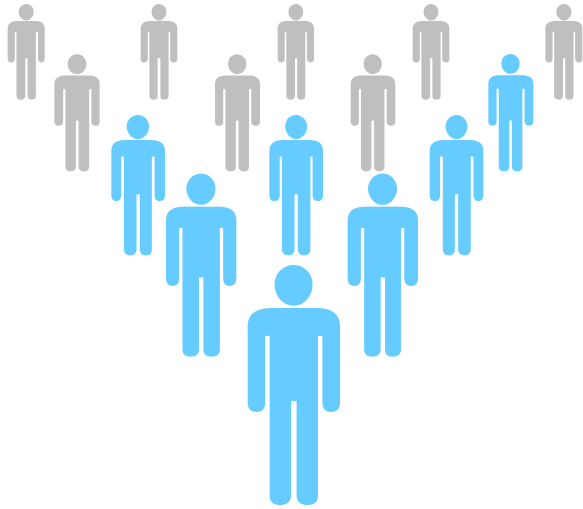
### ➤ Who we serve?

Our machine monitoring solutions have been widely applied in :  
wind energy; petroleum & chemical industry; steel, mining, cement, power plant, paper making....

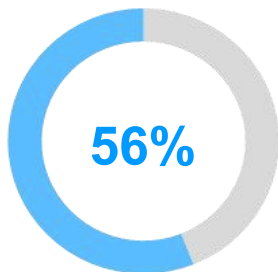
### ➤ Where we sell?

RONDS business has already covered more than 25 countries, and had strong distributors in Brazil, Mexico, Chile, Australia, Singapore, UK etc.

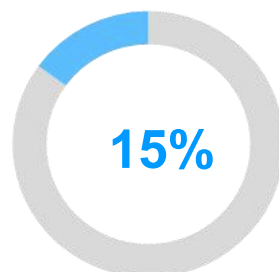
A decorative graphic consisting of several overlapping, curved blue shapes at the bottom right of the slide.



More than 250 employees



R&D team employees



R&D funds

➤ Professional data diagnostic service insurance:

- 20 professional data diagnostic engineers
- 23 members of intelligence algorithm and big data team

# RONDS Introduction



**Sensor technology----Data collection technology----  
Analysis software development----Big data, intelligent  
alarm algorithm----Remote Diagnosis Center.**

**Certification of CE, CGC and GL etc.**

**Complete technology chain development ability**





## Expertise

Expert Opinion of the Notified Body on the Conformity Assessment according to Article 10.5 of R&TTE Directive 1999/5/EC

**PHOENIX TESTLAB**  
EU Identification Number **0700**



Recognised by

BNetzA-69-02/51-55

Expertise No.	14-111864
Certificate Holder	Anhui Rong Zhi Ri Xin Information Technology Co., Ltd.
Address	8th. Floor, #B1, High-tech Innovation Park, #800 Wangjiang West Road, Hefei, Anhui, China
Product Description	Wireless vibration sensor; with ZigBee
Brand Name / Model Name	ROZH / RH503
<b>Opinion on the Essential Requirements</b>	
Article 3.1a): Health and Safety	<b>No remarks</b>
Article 3.1b): Electromagnetic Compatibility	<b>No remarks</b>
Article 3.2: Effective Use of the Radio Spectrum	<b>No remarks</b>

### CE-marking

Marking Example (Class 1) **CE 0700**

This certificate is issued in accordance with the Directive 1999/5/EC of the European Parliament and the Council on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity dated 9<sup>th</sup> March 1999 and is only valid in conjunction with the following annex (2 pages).

Blomberg, 15 April 2014

Place, Date of Issue




Signed by Alan Lane  
Notified Body

Phone +49(0)5235-9500-24  
Fax +49(0)5235-9500-28  
notifiedbody@phoenix-testlab.de

PHOENIX TESTLAB GmbH  
Königswinkel 10  
D-32825 Blomberg, Germany  
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DNV-GL

## TYPE CERTIFICATE

Certificate No.: TC-GL-IV-4-00379-0  
Issued: 2015-06-29  
Valid until: 2017-06-28

Issued for:

**Condition Monitoring System RH1000**

Issued to:

**Anhui Rong Zhi Ri Xin  
Information Technology Co., Ltd.  
(ROZH)**

B1-8, Animation Industry base  
800# Wangjiang West Road, Hefei city, Anhui  
China

According to:

**GL-IV-4:2013 – Guideline for the Certification of Condition Monitoring Systems for Wind Turbines**

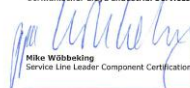
Based on the documents:  
CR-CMS-GL-IV-4-00379-0  
CN-00215Q1155R1M

Certification Report, dated 2015-06-10  
Certificate for the Quality Management System acc. ISO 9001, IQNet, valid until 2018-04-02

Changes of the system design or the manufacturer's or designer's quality system are to be approved by DNV GL; otherwise the Type Certificate loses its validity.

Hamburg, 2015-05-29

For the accredited certification body  
Germanischer Lloyd Industrial Services GmbH



Mike Wöbbecking  
Service Line Leader Component Certification



By DAkkS according DIN EN ISO/IEC 17065  
accredited Certification Body for products. The  
accreditation is valid for the fields of certification  
listed in the certificate.

For the accredited certification body  
Germanischer Lloyd Industrial Services GmbH



Wendy Zhang  
Project Manager

The latest edition of the "General Terms & Conditions of Germanischer Lloyd Industrial Services GmbH" is applicable. German law applies.  
Germanischer Lloyd Industrial Services GmbH, DornKanal 18, 20427 Hamburg, Germany

A solid blue square containing a white, stylized number '2' in the center.

# Intelligent Machinery Condition Monitoring Solution





# Intelligent Machinery Condition Monitoring Solution

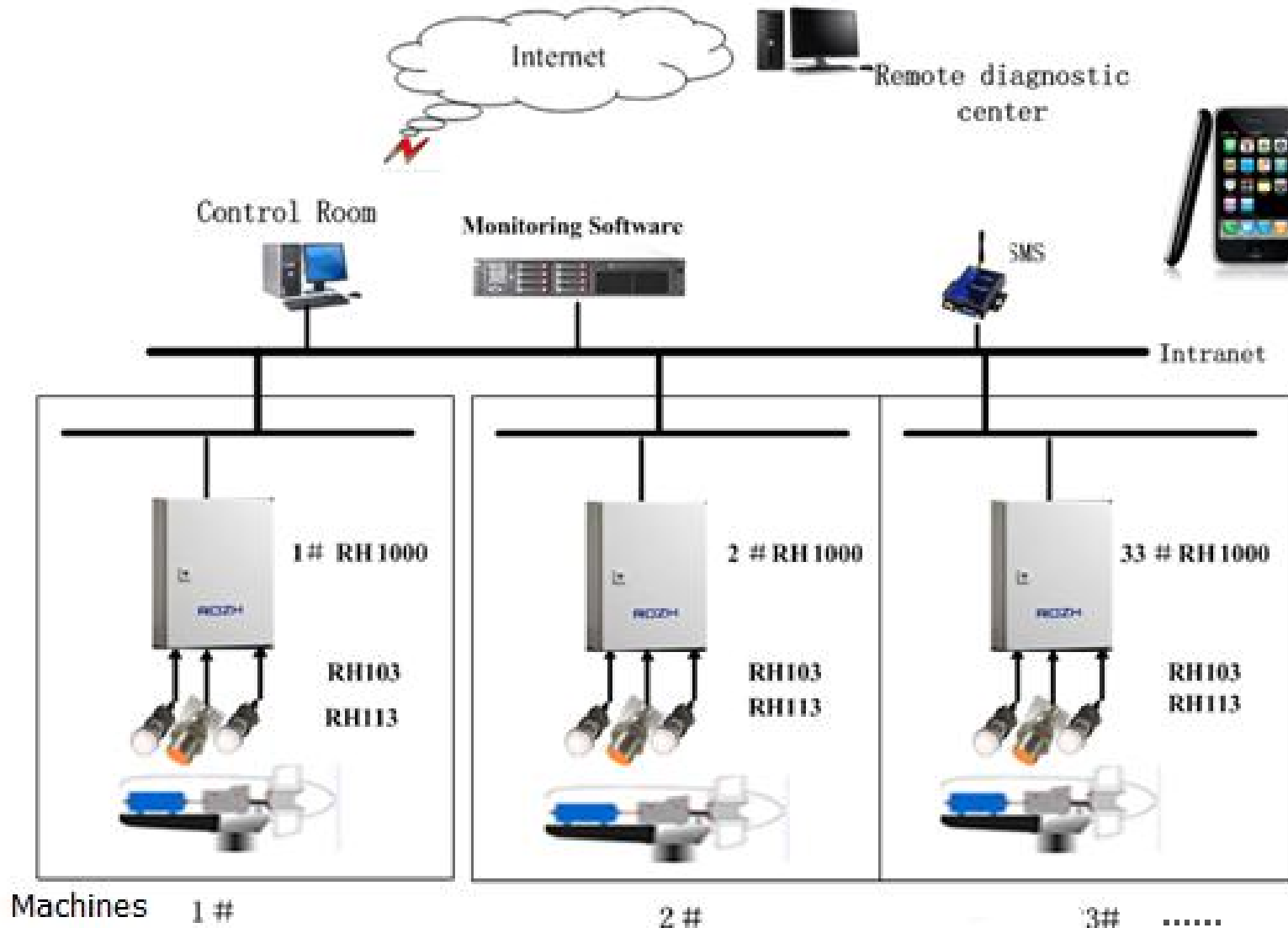


## Intelligent CMS solution mainly includes two levels:

- 1) Application of sensor technology, embedded system technology, network communication technology, data intelligent algorithm, machinery fault diagnosis technology, etc realizes the intensive management of group company.
- 2) Application of condition monitoring and fault diagnosis realizes production machinery predictive maintenance.



# Intelligent Machinery condition monitoring Solution



# Intelligent Machinery Condition Monitoring Solution



## RH1000 Online data collector

Installed in production field for data receiving, conditioning, storing, sending sensor signal, receiving and conducting the collection parameter sent by server.



# Intelligent Machinery Condition Monitoring Solution



## RH1000 Online data collector

Main parameters:

16 channels of vibration and temperature (AI)

4 channels of processing information

2 channels of speed

Working temperature:  $-40\sim 70^{\circ}\text{C}$

Protection grade: IP65

Size: 300\*400\*167mm

Weight: 9.8kg

Certificates: **GL**、**CE**、**CGC**



# Intelligent Machinery Condition Monitoring Solution



## RH103 Standard accelerometer RH113 Low frequency accelerometer

Parameter	RH103	RH113
Sensitivity	100mv/g	500mv/g
Frequency range	0.5Hz-15KHz	0.1Hz-10KHz
Range	$\pm 80g$	$\pm 10g$
Protection grade	IP68	
Working temperature	$-55-125^{\circ}C$	
Certification	CE	



# Intelligent Machinery Condition Monitoring Solution



## Sensor installation:

1.Reserved hole installation

2.Magnetic base and industrial glue installation

3.Cable with stainless armored hose



# Intelligent Machinery Condition Monitoring Solution



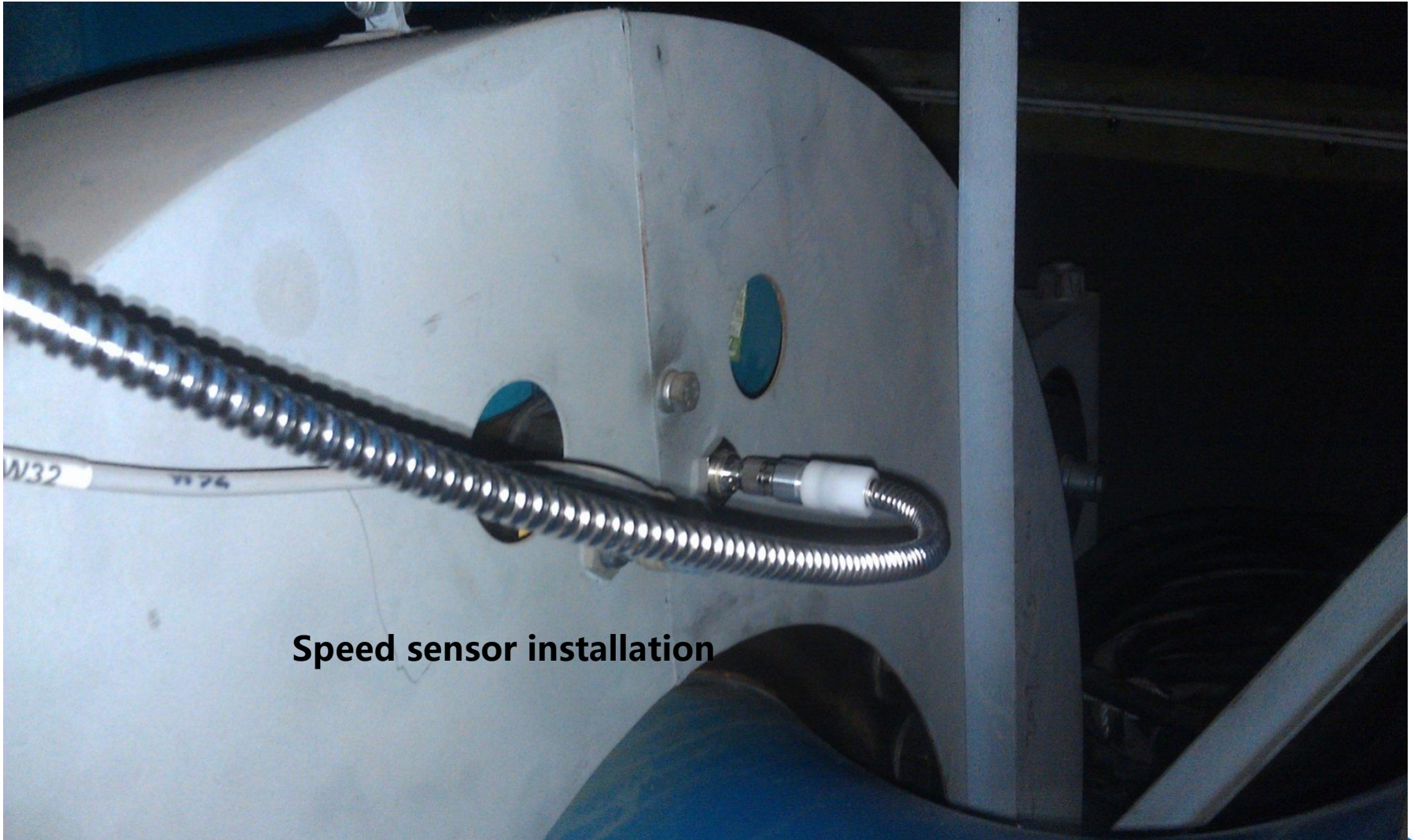


# Intelligent Machinery Condition Monitoring Solution



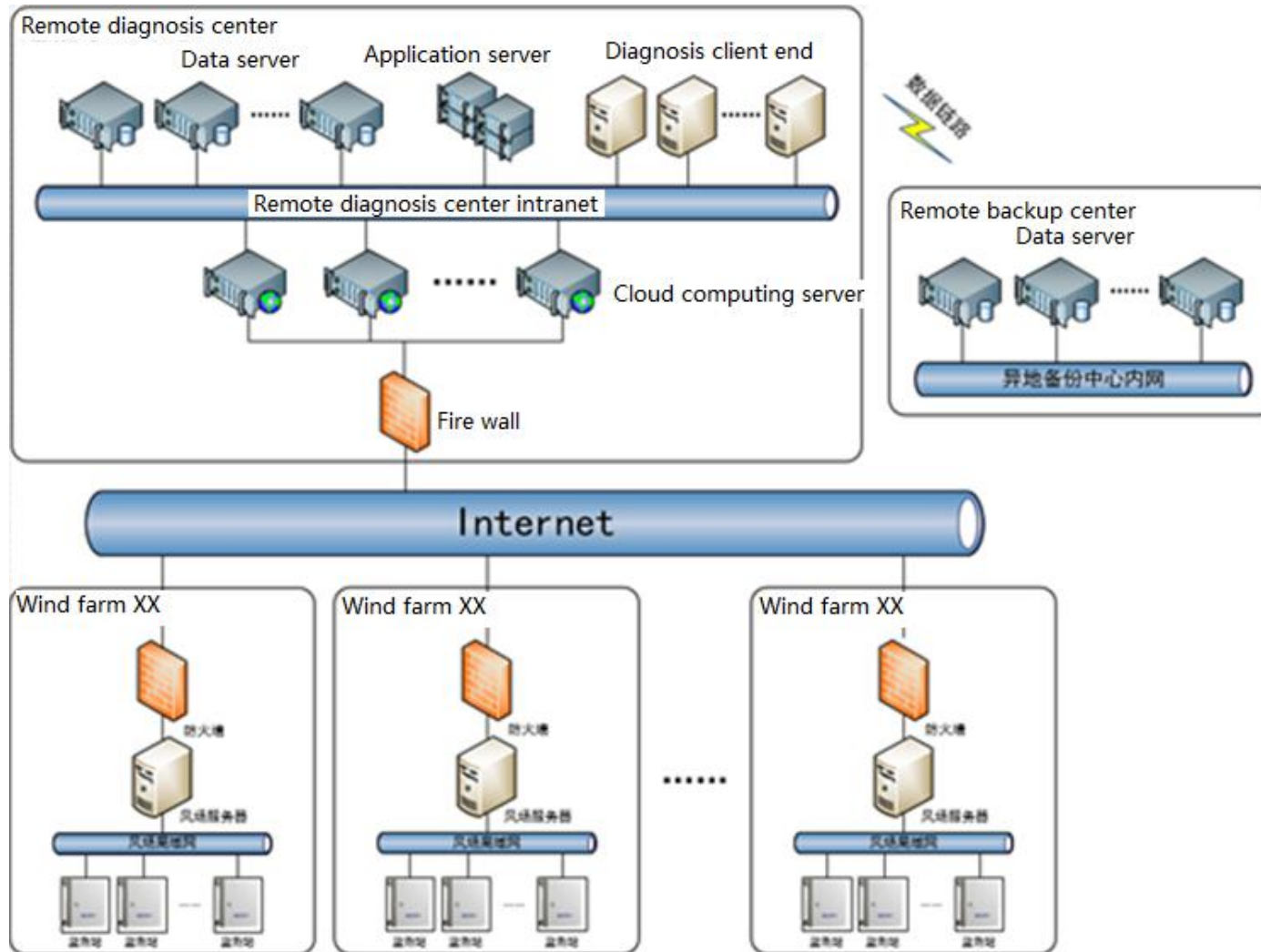


# Intelligent Machinery Condition Monitoring Solution



Speed sensor installation

# Intelligent Machinery Condition Monitoring Solution



# Intelligent Machinery Condition Monitoring Solution



Main features:

Scalability:

Each production plant monitoring center can have multiple servers.

Provide open standard data interface

Provide Web Service, WCF Service etc standard data interface for the third party data transferring, the third party shall provide data format explanation, so we can transfer it into the data format which our remote diagnosis center accepts. Thus the clients can monitor the data in one platform

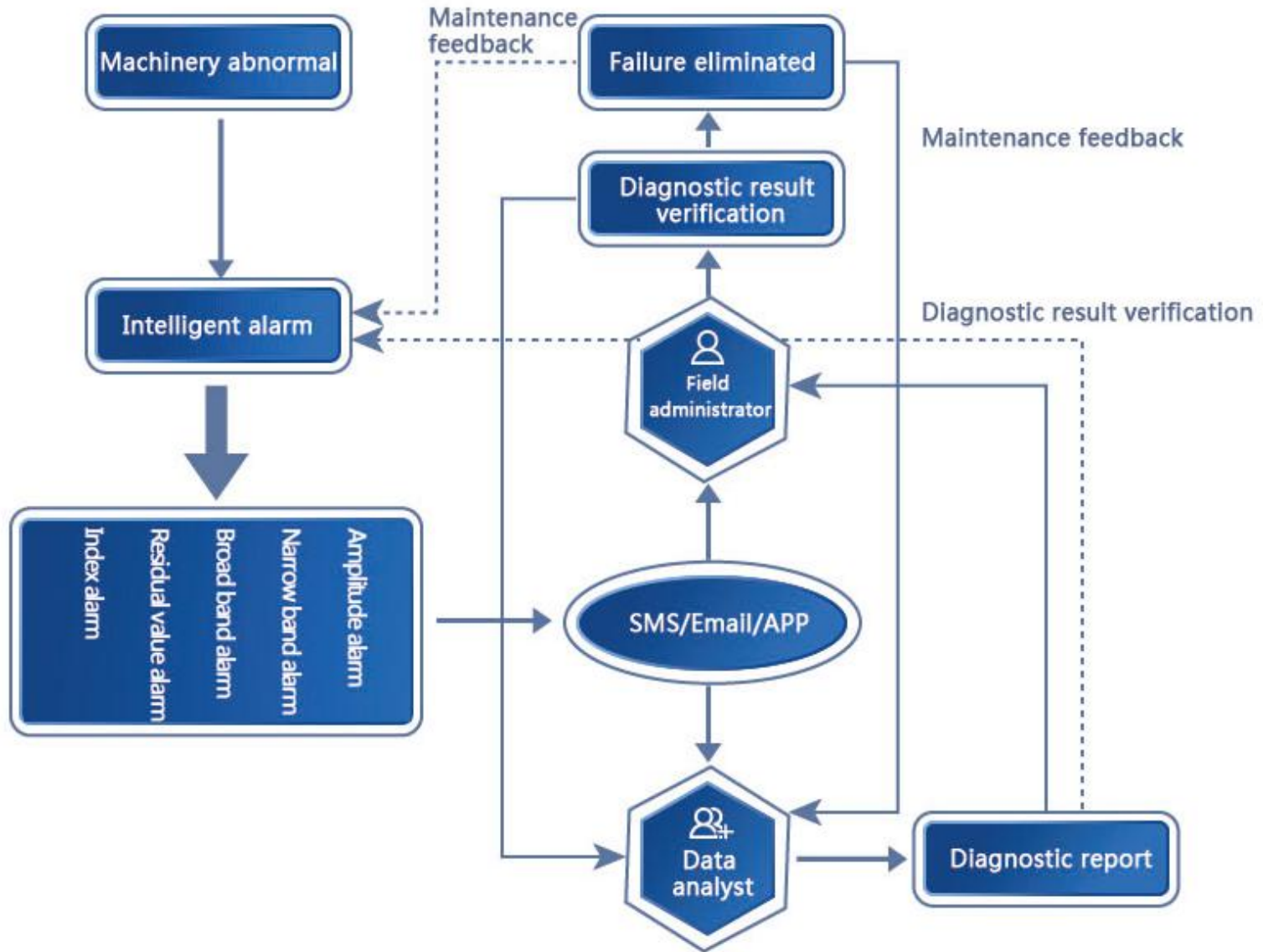


# Intelligent Machinery Condition Monitoring Solution



MOS3000	System setting	Statistical information	
		Log management	
		Machine configuration	
		User authority	
	Self-diagnosis	Identify network abnormal	
		Identify collection station abnormal	
		Identify sensor abnormal	
		Generate fault components frequency	
	Report	Different reports	
		Diagnosis report	
		Inspection report	
	Index analysis	Margin	Frequency band energy
		Pulse	Average value
		Peak	Minimum value
		Crooked	Maximal value
		Kurtosis	Rad. amplitude
	Condition analysis	Long time waveform	Envelope
		Multi spectrum trend	Cepstrum
		Multi time waveform	Channel temperature trend
		Trend	Speed waveform
		Spectrum	Waterfall
		Time waveform	
	Condition monitoring	Browse alarm information	
Browse machine detailed condition			
Operation condition monitoring			

# Intelligent Machinery Condition Monitoring Solution





## Monitoring Difficulties & Solutions



# Monitoring Difficulties & Solutions



## Monitoring difficulty one

- Low frequency
- Low speed and heavy load
- Under low speed, the monitoring and diagnosis is a difficult point

## Solution

- Long time waveform
- Envelope

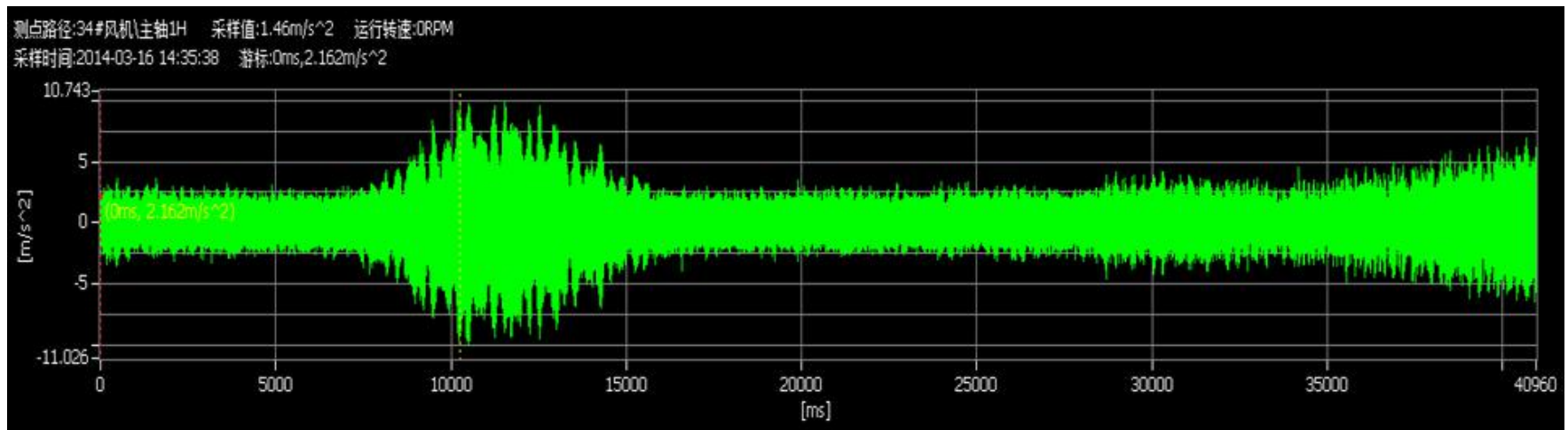


# Monitoring Difficulties & Solution

## Long time waveform

Wired collection station supports all channel long time waveform collection, data length could be 4M (If analysis frequency is 20KHz, it can collect 81.92seconds)

- Capture complete fault waveform
- Improve spectrum resolution





# Monitoring Difficulties & Solution



## Monitoring difficulty two

Variable speed working condition

## Solution

Full sampling technology



## Full sampling technology

Data collection strategy of traditional vibration monitoring is collection according regular time interval. The collection density is fixed. It can not collect data intelligently according to the operation condition. This will lead the lack of effective vibration data and missing of alarm.



# Monitoring Difficulties & Solution



Full sampling technology can avoid the disadvantages of traditional data collection. In short, it is "full time sampling+intelligent storage" data collection strategy.

"Full sampling" means the vibration system collects data 24hours a day uninterruptedly. The data is comprehensive, including usual collection parameter, long time waveform, time index (kurtosis, peak value, RMS)etc.



# Monitoring Difficulties & Solution



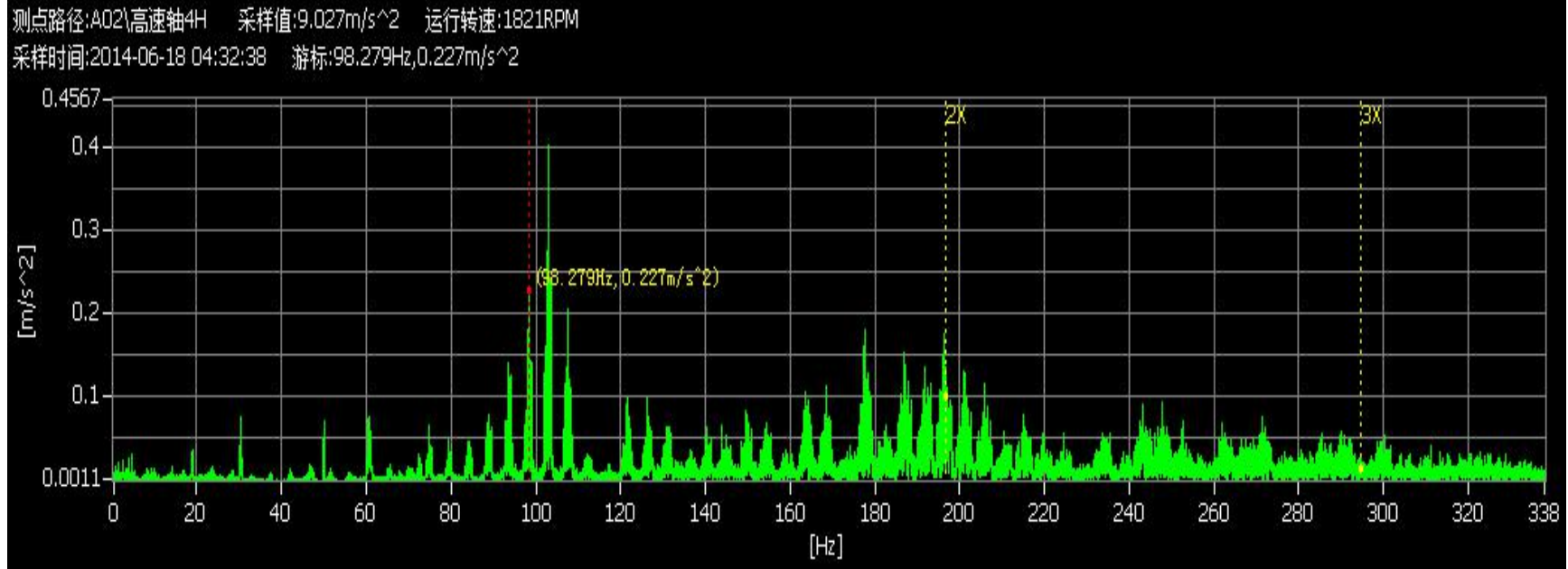
## Two types of intelligent storage

1) Judge the machine working condition according to machine speed data, selectively save data under different speeds and machine start&stop.

2) System will store the vibration data according to the judgement of kurtosis, RMS value, etc to guarantee that the abnormal data could be captured. Meanwhile the processing information abnormality can also trigger the storage of the vibration data in the same time

# Monitoring Difficulties & Solution

The usual data collection method could cause the frequency aliasing or incorrect amplitude in the spectrum analysis.



# Monitoring Difficulties & Solution

## FFT分析

Time: *When* ?

相对于时钟  
[sec]



Frequency spectrum:

*多少次?*  
[每秒]



## 阶次跟踪分析

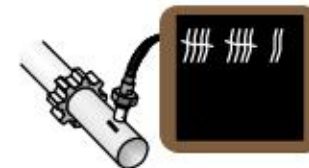
"Time": *When* ?

相对于轴的旋转  
[Rev]



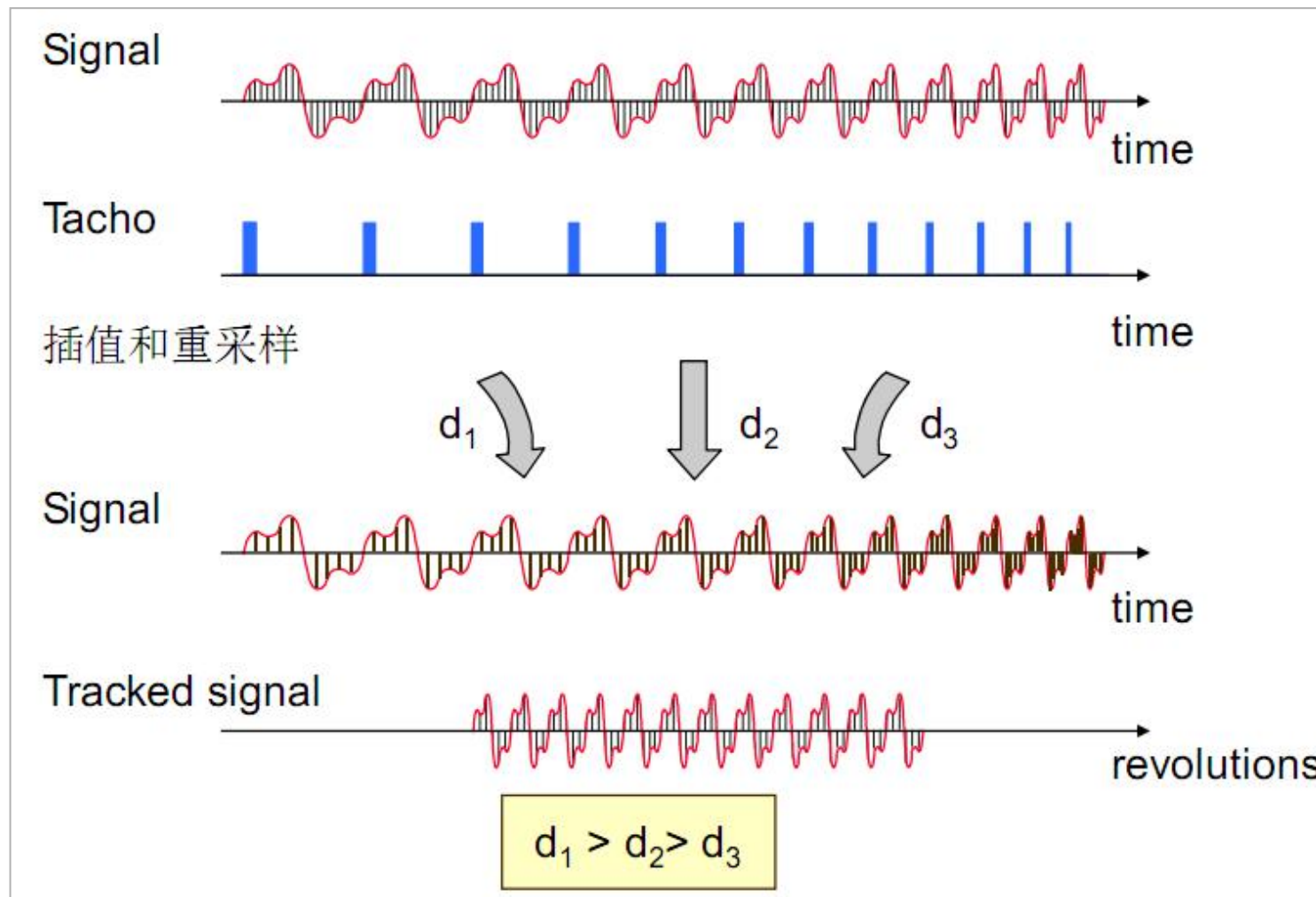
Order spectrum:

*多少次?*  
[每转]

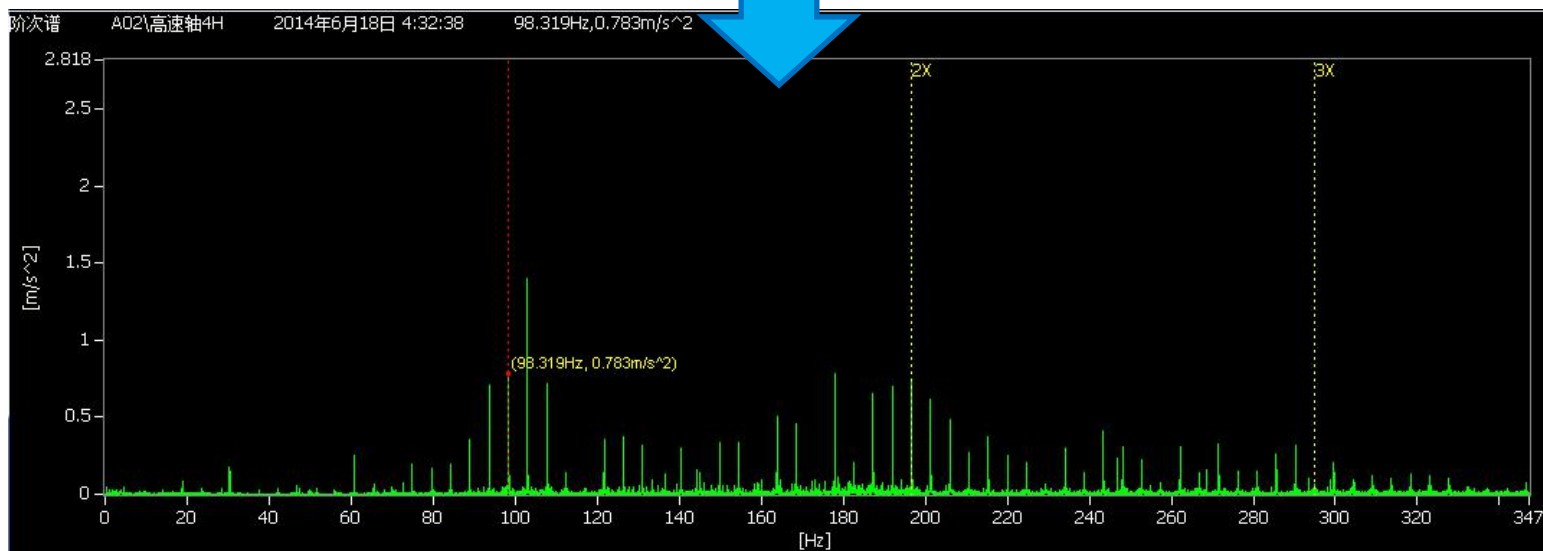
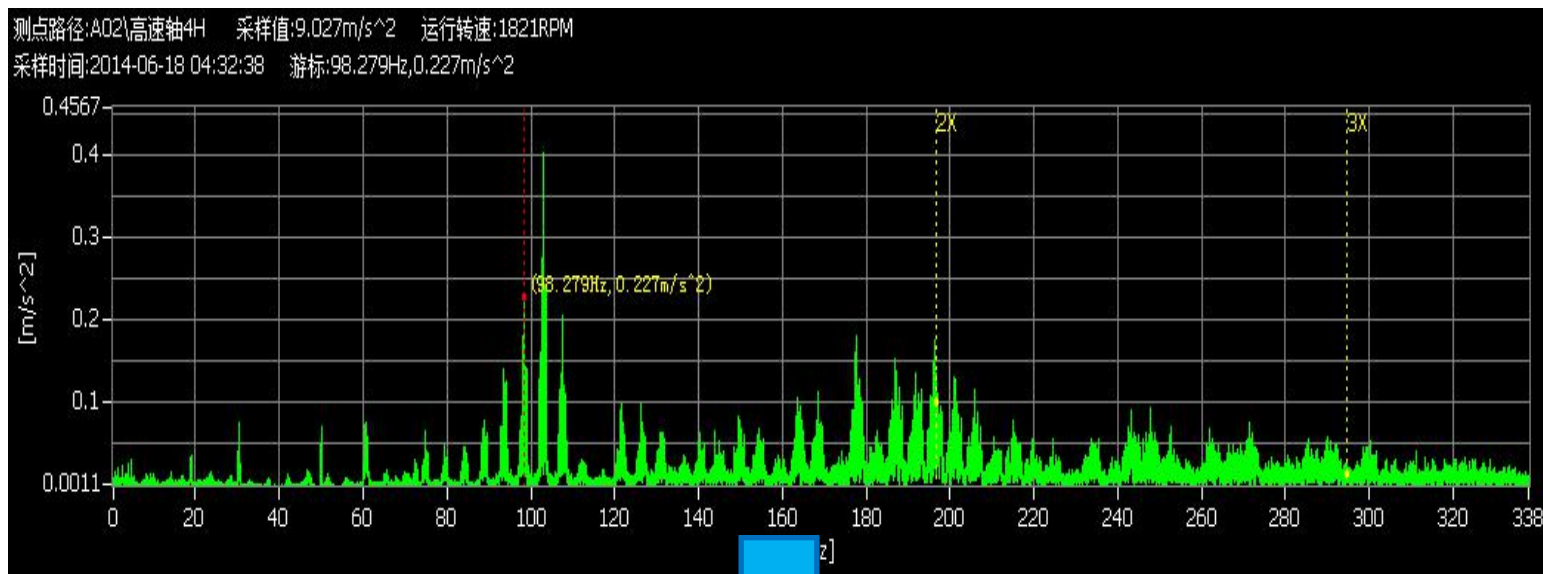


	FFT分析	Order Tracking Analysis
信号	时间 [sec]	转 [Rev]
谱	频率 [Hz] [每秒]	谐波 [阶次] [每转]

# Monitoring Difficulties & Solution



# Monitoring Difficulties & Solution







## Remote Diagnosis Center



# Remote Diagnosis Center



The fault diagnosis experts will analyze the origin of mechanical fault, predict the component lifecycle, providing guide for machinery maintenance staff.

Based on experiences accumulation, and together with the research of fault characteristics, we are endeavoring to realize automatic intelligent diagnosis of system.



# Remote Diagnosis Center



## Remote Diagnosis Center

Successful diagnosis cases are more than 500.

Collected more than 100 fault components, each component has a real case and complete fault circle signal



# Remote Diagnosis Center





# Remote Diagnosis Center







## Customers and Typical Cases



# CMS customers:




We are monitoring more than 6,000 units machines in wind power industry.

## Wind power group companies

 China Datang

 China resources

 Power Investment

 Guohua Group

 China Guodian

 China Huaneng

 China Huadian

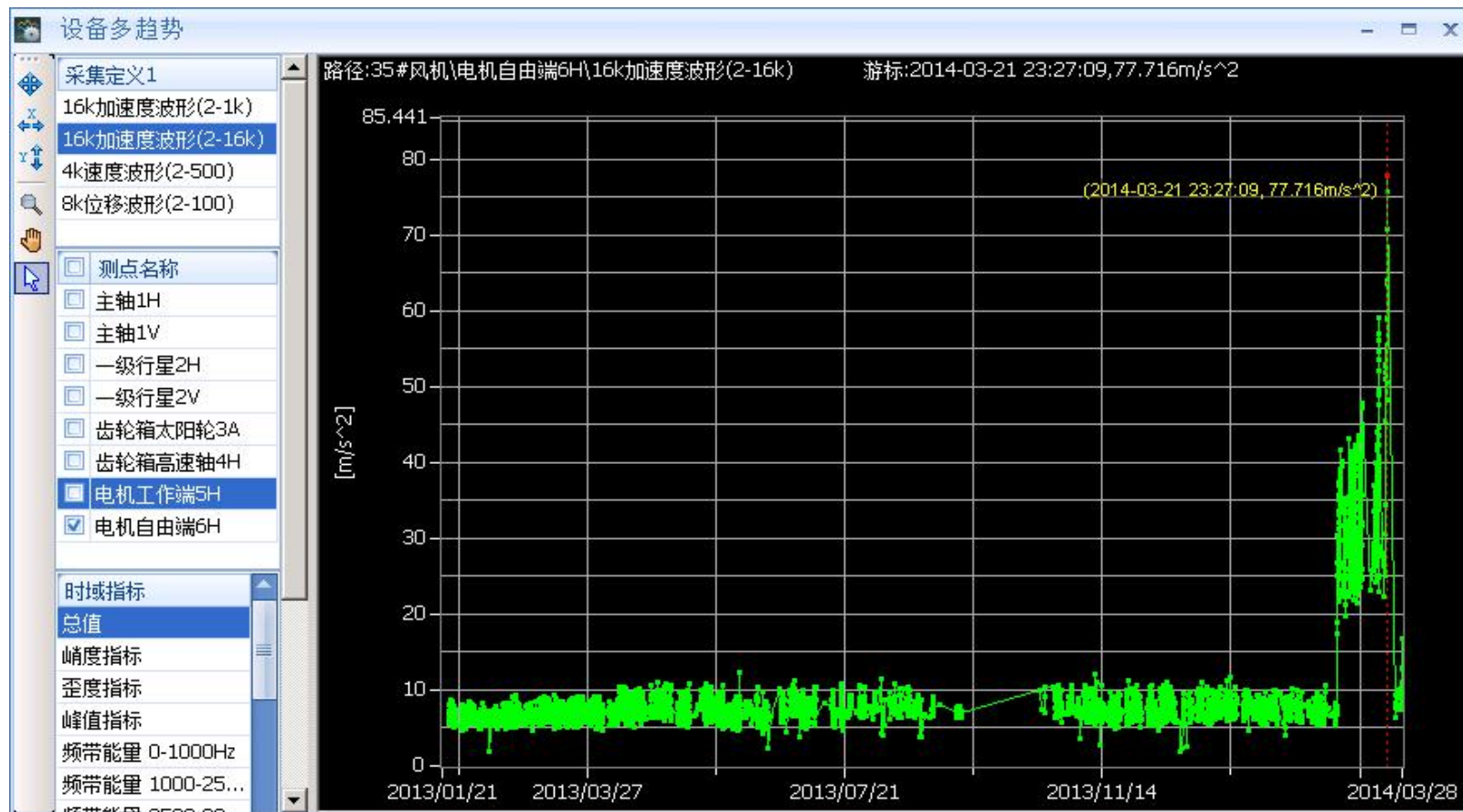
 Hebei Construction&Investment



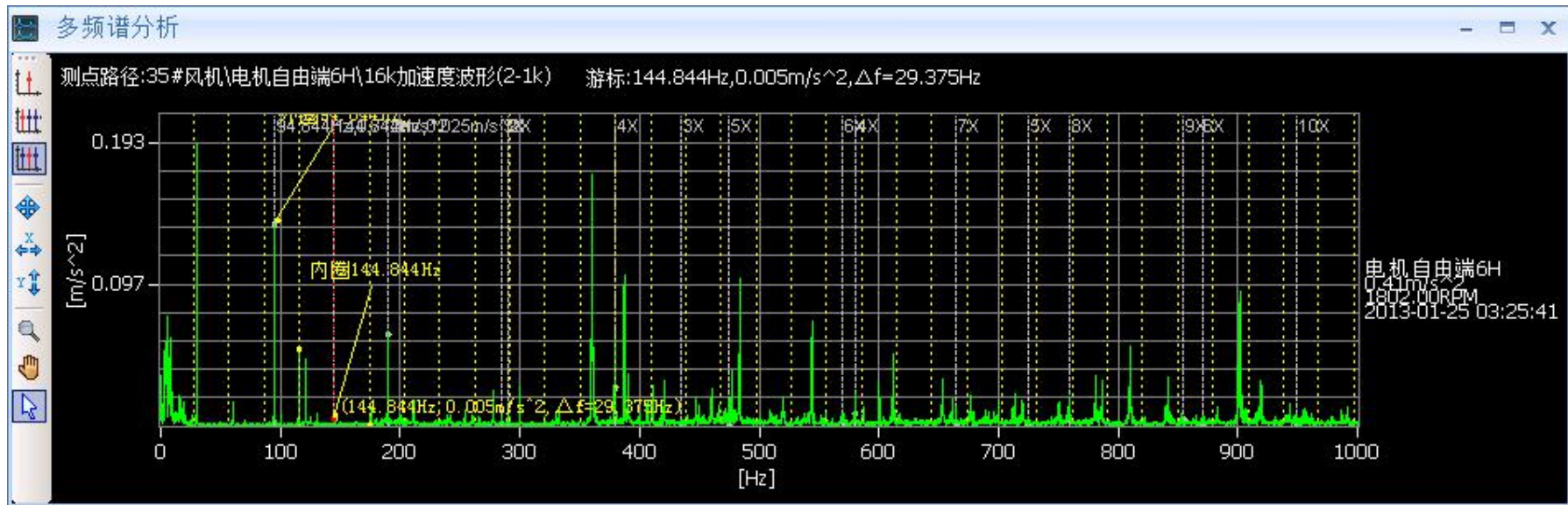
# Customers and Typical Cases

## Case one: quick degradation process

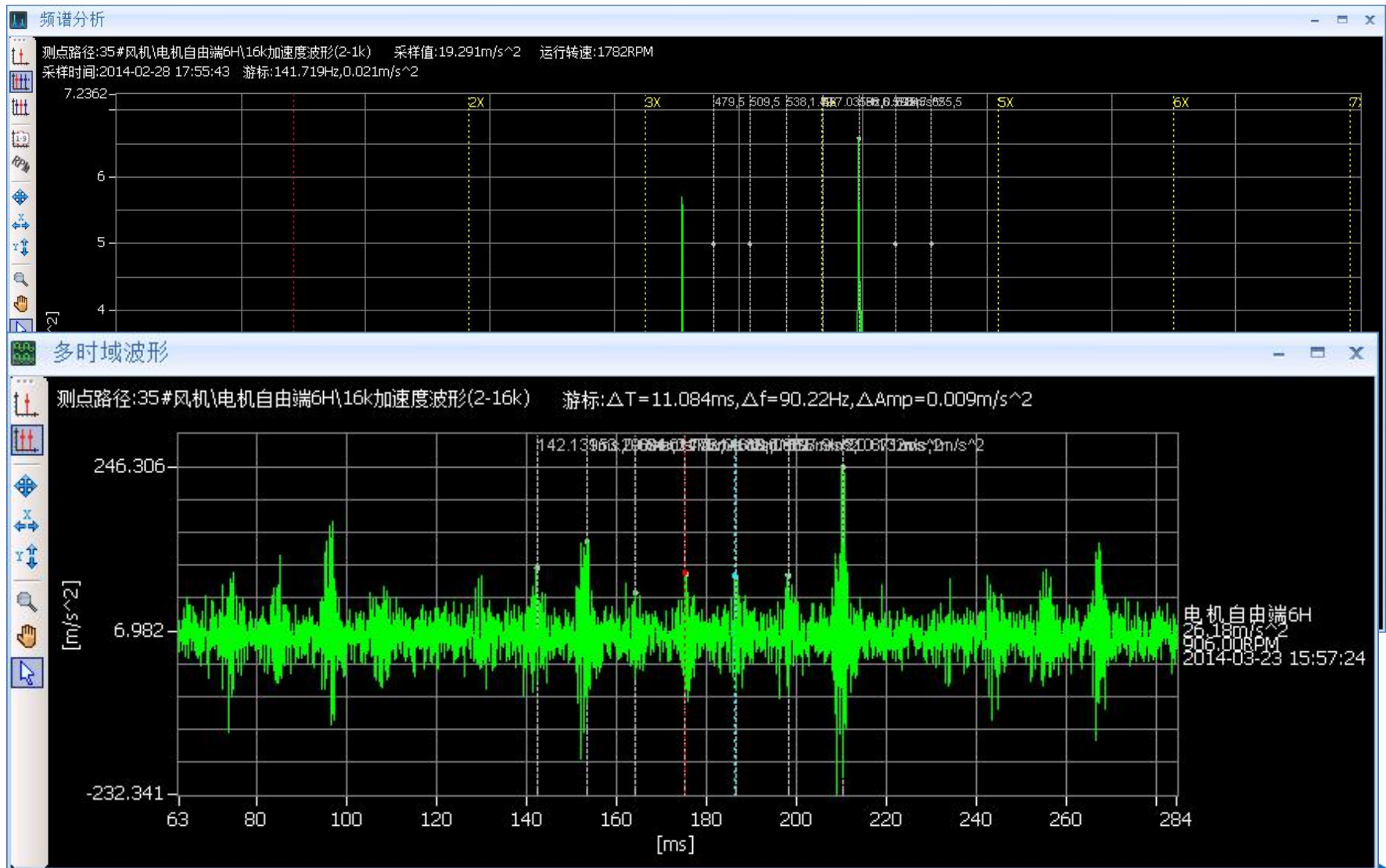
Acceleration (2-1k) trend: 2013, January to Feb. 27th, 2014 the amplitude is stable. From Feb. 27th to 21st March, amplitude trend reached to 77m/s<sup>2</sup>.



# Customers and Typical Cases



# Customers and Typical Cases



# Customers and Typical Cases



# THANKS



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