“Fertilizer Plant VMS Solutions : Smart , Reliable & Connected 24X7…365 Days”

Forbes Marshall Overview

Sales
US$ 160 Million

Proud heritage
90+ Years

Global Presence
30+ offices

Products & Services
300+

Factory Space
60,000+ sq mtrs

Manufacturing facilities
5

Certification
ISO 9001:2008

EMS (ISO 14001)

OHSAS (18001)

Trained Professionals
1500+

Sales & Service Engineers
300+

R&D Engineers
80+

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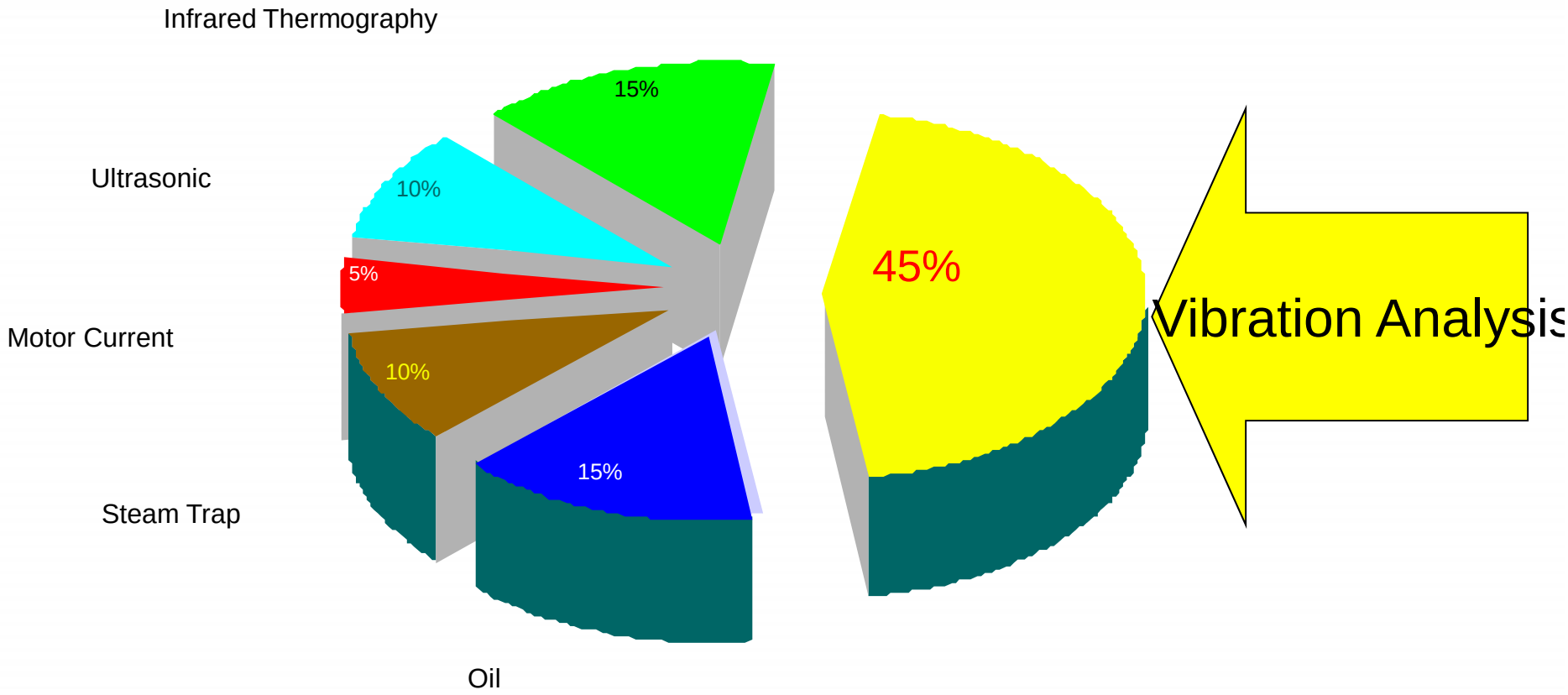
Which Technology offers the best return?



Of all the various maintenance technologies, Vibration Analysis provides the greatest percentage of payback when adopting a predictive maintenance program

Fertilizer Plants : CMS Issues in India

- Right & Reliable Vibration Sensors & Monitoring System along with optimum Life Cycle Cost.
- On Line Vibration Analysis & Diagnosis system not there in many plants, & in case it is there not used effectively or not maintained well.
- Technical Competency of the team to use the system and get the result.

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- **Right & Reliable Vibration Sensors & Monitoring System along with optimum Life Cycle Cost.**

API 670

Temperature			Accuracy Requirements as a Function of Temperature	
Components	*Testing Range*	*Operating Range*	*Within Testing Range*	*Outside Testing Range but Within Operating Range*
Proximity probes	0°C to 45°C (32°F to 110°F)	–35°C to 120°C (–30°F to 250°F)	Incremental Scale Factor: ± 5% of 7.87 mV/µm (200 mV/mil)	Incremental Scale Factor: An additional ±5% of the testing range accuracy
Extension cables	0°C to 45°C (32°F to 110°F)	–35°C to 65°C (–30°F to 150°F)	Deviation from Straight Line: within ±25.4 µm (±1 mil) of the best fit straight line at a slope of 7.87 mV/µm (200 mV/mil)	Deviation from Straight Line: within ±76 µm (±3 mils) of the best fit straight line at a slope of 7.87 mV/µm (200 mV/mil)
Oscillator-demodulators	0°C to 45°C (32°F to 110°F)	–35°C to 65°C (–30°F to 150°F)	Minimum linear range: 2 mm (80 mils)	Minimum linear range: same as for testing range
Accelerometers and accelerometer extension cables	20°C to 30°C (68°F to 86°F)	–55°C to 120°C (–65°F to 250°F)	• Principal Axis Sensitivity: 100 mV/g ±5% • Amplitude Linearity: 1% from 0.1 g pk to 50 g's pk • Frequency Response: ±3 dB from 10 Hz to 10 kHz, referenced to the actual measured principal axis sensitivity.	Principal Axis Sensitivity: 100 mV/g ±20%
Temperature sensors and leads	0°C to 45°C (32°F to 110°F)	–35°C to 175°C (–30°F to 350°F)	±2°C (±4°F) over a measurement range from –20°C to 150°C (0°F to 300°F)	±3.7°C (±7°F) over a measurement range from –20°C to 150°C (0°F to 300°F)
Monitor system components for measuring				
Radial Vibration, Axial Position, Piston Rod Drop, and Casing Vibration	0°C to 45°C (32°F to 110°F)	–20°C to 65°C (0°F to 150°F)	±1% of full scale range for the channel	Same as for testing range
Temperature			±1°C (±2°F)	Same as for testing rang
Speed and Over speed				Same as for testing range

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API 670 Sensors & Monitors

- Non Contact type sensors for Radial Shaft, Axial Shift, Rod Drop & Key phasor measurement
- SIL-3 Compliant

- Contact Type Sensors for Acceleration and Velocity Measurement

- Comply with API 670
- Configurable by PC
- SIL 1 Compliant

Products Approval Required…

Transducer System

API 670
Confirming to SIL-3
ATEX Certificate as per Latest EN Std.
CCOE Nagpur Certificate being hazardous area installation

Certificate / Certificat
Zertifikat / 合格証
SST 1509121 C001
exida hereby confirms that the
FK Series Eddy-Current Transducers
SHINKAWA Sensor Technology, Inc.
4-22, Yoshikawakogyodanchi,
Higashihiroshima-shi, Hiroshima
739-0153, JAPAN
Have been assessed per the relevant requirements of
IEC 61508 : 2010 Parts 1-7
and meets requirements providing a level of integrity to:
Systematic Capability: SC 3 (SIL 3 Capable)
Random Capability: Type A Element
SIL 2 @ HFT=0; SIL 3 @ HFT = 1; Route 2_H
PFD_{avg} and Architecture Constraints must be verified for each application

Safety Function:
The FK Series Eddy-Current Transducers will measure Shaft Vibration, Axial Position, Rotating Speed and Phase Mark (Phase Reference) within the stated safety accuracy.

Application Restrictions:
The unit must be properly designed into a Safety Instrumented Function per the Safety Manual requirements.

Evaluating Assessor
Certifying Assessor

Page 1 of 2

GOVERNMENT OF INDIA
MINISTRY OF COMMERCE & INDUSTRY
PETROLEUM AND EXPLOSIVES SAFETY ORGANISATION (PESO)
(Formerly Department of Explosives)
CGO COMPLEX SEMINARY HILLS
NAGPUR 440006
SPEED POST

Letter No: A/P/HQ/MH/104/2975(P315797)
Email: explosives@explosives.gov.in
Phone/Fax No.2510248/2510577
Dated : 4/4/2013

To
M/s. Shinkawa Sensor Technology Inc.
4-22 Yoshikawa Kogyodanchi
Higashihiroshima, 739-0153, JAPAN.

Sub: Approval of Intrinsically safe type Displacement transducer under Petroleum Rules,2002.

Dear Sir(s),

Please refer to letter No SAM/CCE/Shinkawa/Jan-2013 dated 04/01/2013 from M/s. Forbes Marshall Pvt. Ltd.,Pune on the above subject.

The following Intrinsically Safe equipment(s) manufactured by you according to EN 60079-0 : 2009 & EN 60079-11 : 2012 standards and covered under LCIE, France Test reports mentioned below is approved for use in **Zone 0 and Zone 1** of Gas Group IIC hazardous areas coming under the purview of the Petroleum Rules, 2002 administered by this Organization.

Sr.No	Description	Safety Protection	CCEs Identification Number	Test House	Test Report No.	Drawing Numbers
1	Displacement Transducer Type VK-… , RD-… , FK-… , GK-…	Ex ia IIC T4 Ga	P315797/1	LCIE, France	LCIE 03 ATEX 6222 X (Supplement 7) Dt.24/10/2012	As per Test Report

This Approval is granted subject to observance of the following conditions:-

1). The design and construction of the equipment shall be strictly in accordance with description, condition and drawings as mentioned in the LCIE, France Test Reports referred to above
2). The equipment shall be used only with approved type of accessories and associated apparatus
3). The equipment shall be used only in conjuction with the approved Intrinsically Safe barriers
4). Each equipment shall be marked either by raised lettering cast integrally or by plate attached to the main structure to indicate conspicuously
(a) Name of the manufacturer
(b) Name and number by which the equipment is identified
(c) Number & Date of the test Report of the LCIE, France applicable to the equipment
(d) CCEs Identification Number of this letter by which use of the apparatus is approved
5). A certificate to the effect that the equipment has been manufactured strictly in accordance with the drawing referred to in the LCIE, France test report and is identical with the one tested and certified at LCIE, France shall be furnished with each equipment
6). The customer shall be supplied the copy of this letter, an extract of the conditions and maintenance schedule, if any recommended by LCIE, France in their test reports and copy of instructions booklet

Machine Monitoring System

API 670

Exida FMEDA report conforming to SIL1 for the offered Shinkawa make machine monitoring system (MMS)

exida®

Failure Modes, Effects and Diagnostic Analysis

Project:
VM-7 Condition Monitor

Company:
SHINKAWA Sensor Technology, Inc.
Higashihiroshima, Hiroshima Pref.,
Japan

Contract Number: Q14/05-012
Report No.: SHN 14/05-012 R001
Version V2, Revision R5, December 18, 2014
Griff Francis

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Fertilizer Plants CMS : Case Studies

1. **Syngas Compressor (Zuari)**

1. **Carbamite Pump (GSFC)**

1. **Ammonia Compressor (Coromondal)**

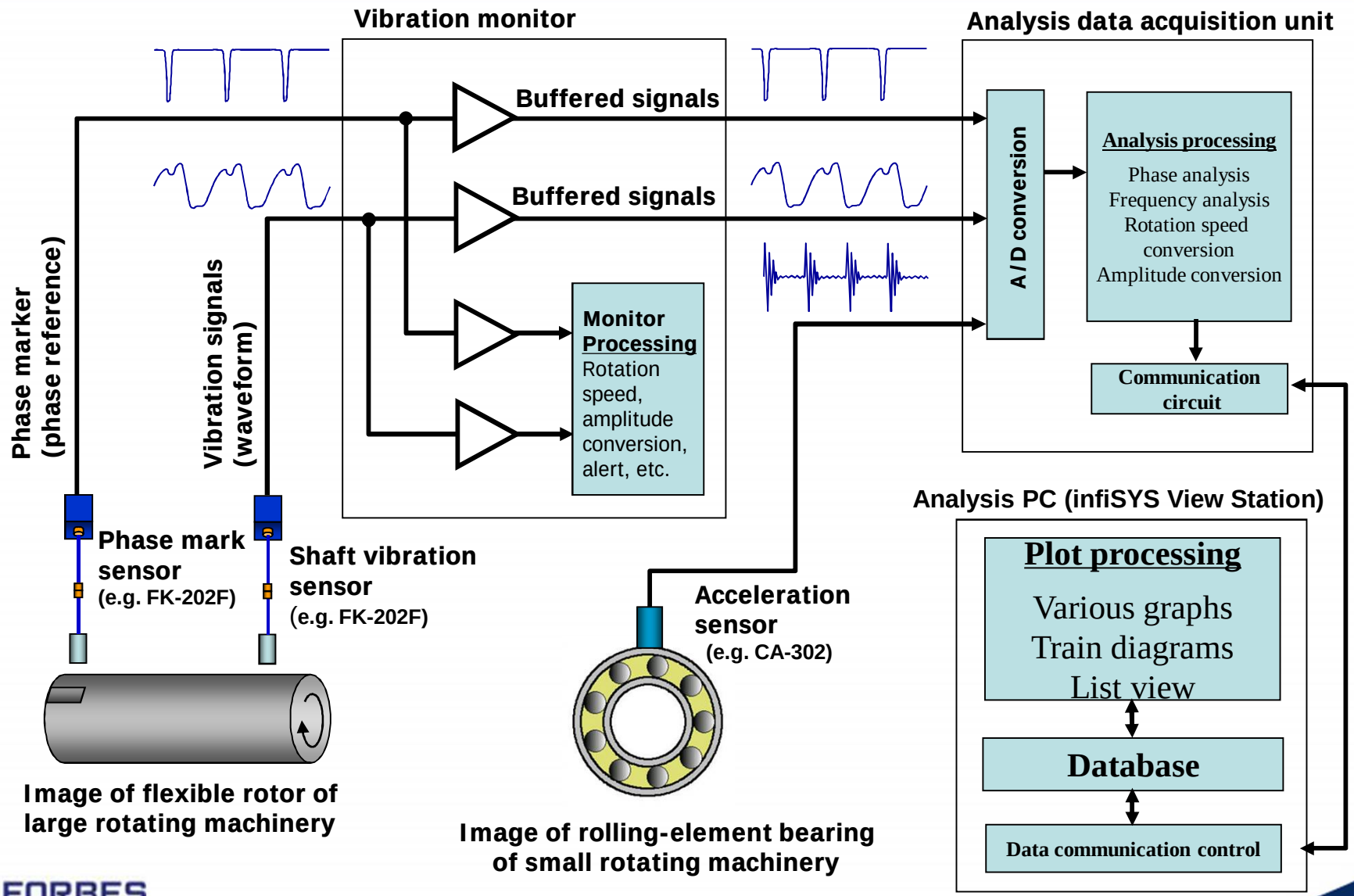
1. **Turbine & Generator (Kribhco)**

Fertilizer Plants CMS Solutions

S.N.	MACHINE	FM Shinkawa Offering	PARAMETER
A	1st Level Critical Machines	Compliant to API 670 Std.	EX / ATEX /GEO Certified
1	Compressors (Air & Gas type)	Transducer : FK Series, CA & CV Series Monitor : VM7 Series & Infisys RV200 Analysis & Diagnostic Software	Radial Shaft, Axial Shift, Casting Vibration, Key Phasor Measurement
2	Turbines		
3	Boiler feed & Ammonia feed Pump – 1St Critical		
B	2nd Level Critical Machines		
1	Pump (HP/LP/MP)– 2nd Critical	Transducer : FK Series, CA & CV Series Monitor : VM-5 or VM-7 Monitoring System	Radial Shaft, Casing Vibration, Key Phasor Measurement
2	Turbo Blowers		
3	Cooling Tower Fans	Non API VMS, Transmitter based system	

- **On Line Vibration Analysis & Diagnosis system not there in many plants, & in case it is there not used effectively or not maintained well.**

How signals are processed
Vibration Analysis and Diagnostic System



System Config : Mix of Large and Small Rotating Machinery

infiSYS View Station

infiSYS View Station

Software installed:

Software installed:

HUB

Ethernet

Ethernet

Non API System

CRITICAL MACHINES

API System

infiSYS data acquisition unit DAQpod AP-2000

API 670 Monitor

Buffered signals

Third Party System

infiSYS data acquisition unit DAQpod AP-2000

Non API

Shaft vibration, phase mark sensors

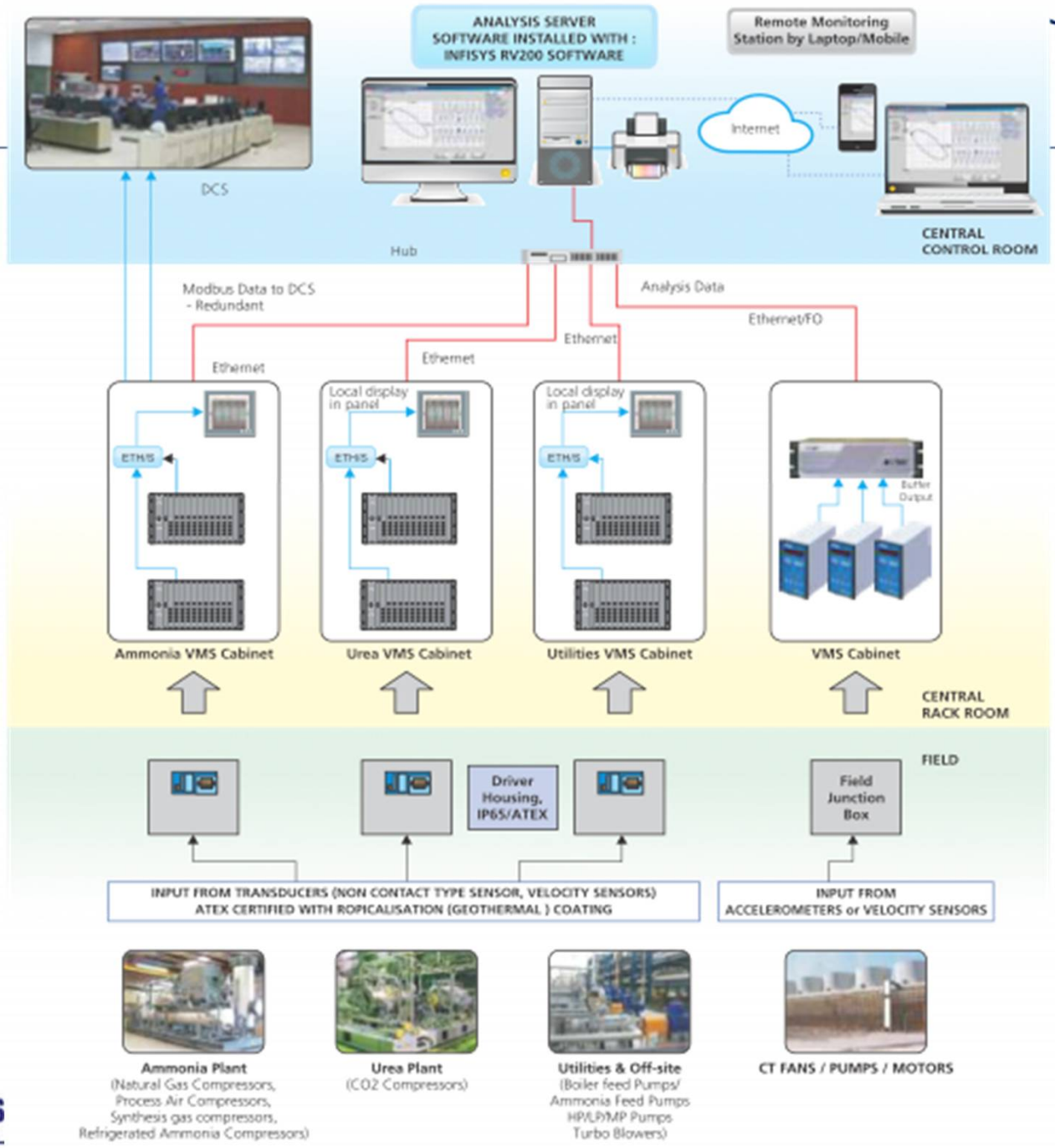
Acceleration sensors

large rotating machinery

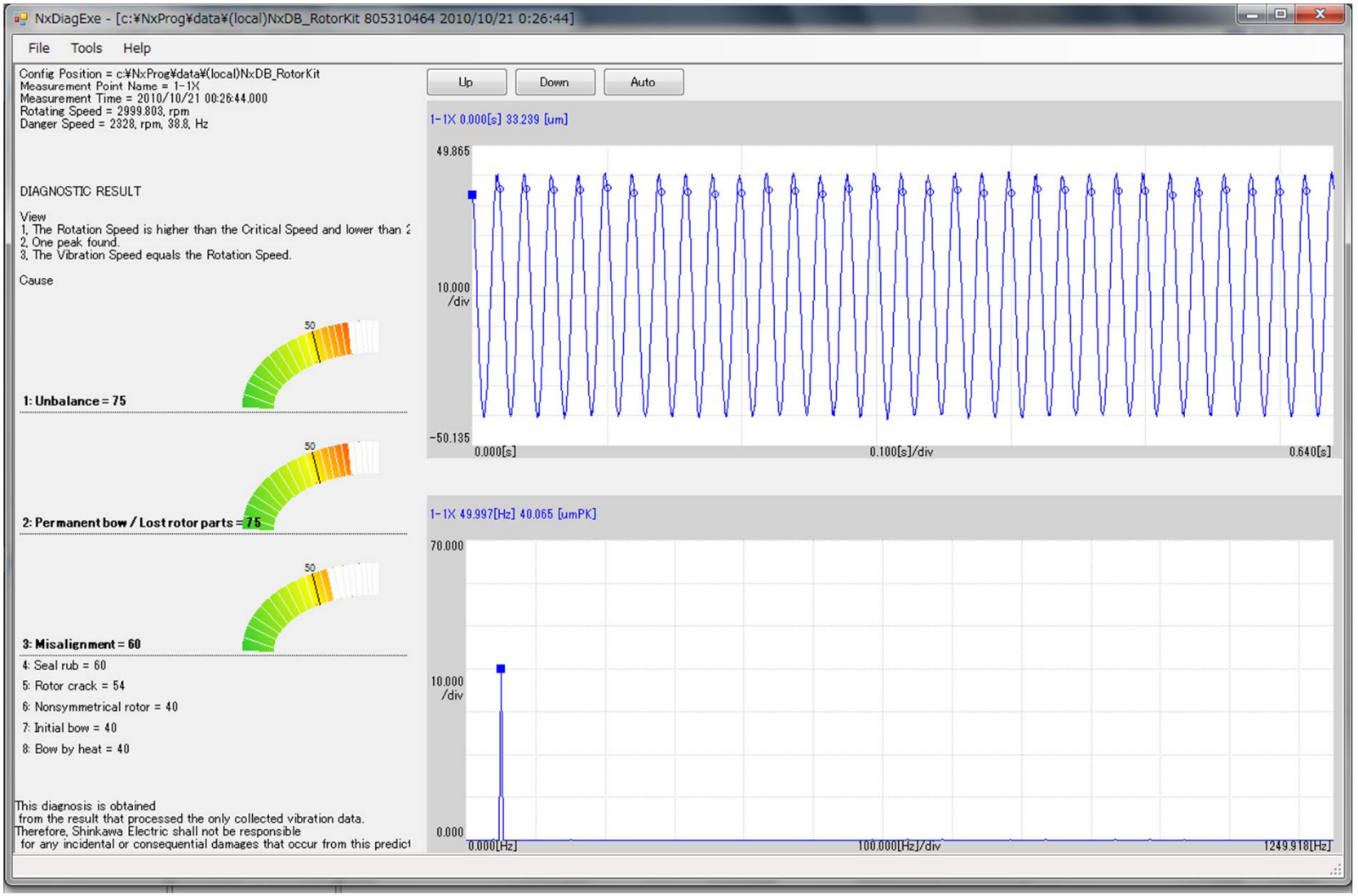
Large rotating machinery

Small rotating machinery

Plant-wide Machine Condition Monitoring & Protection System in Fertlizer Plant



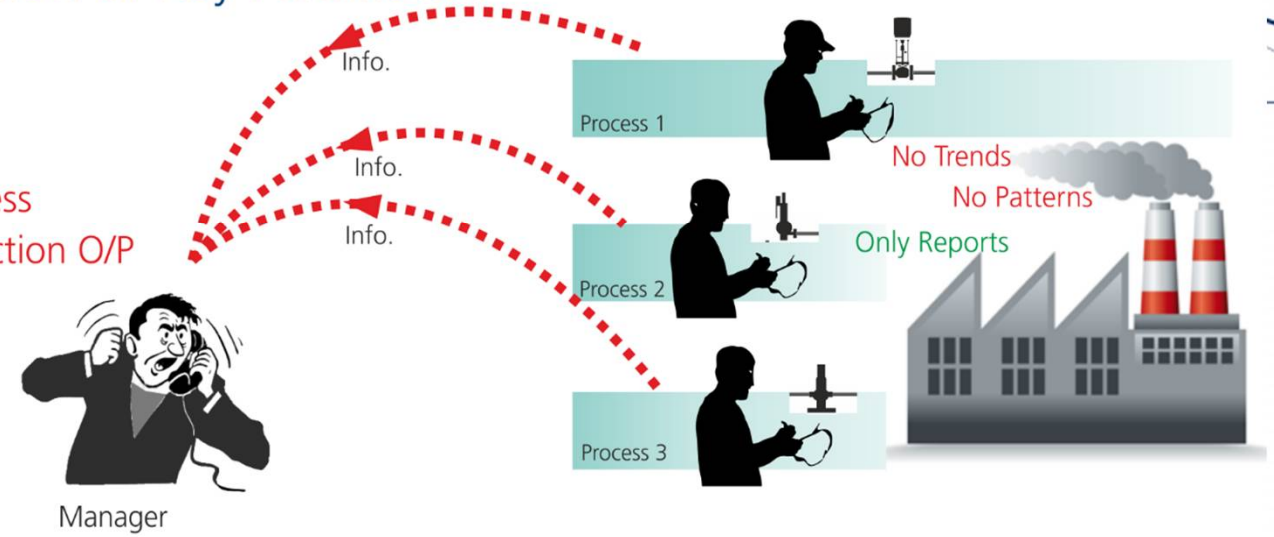
Diagnostic Software

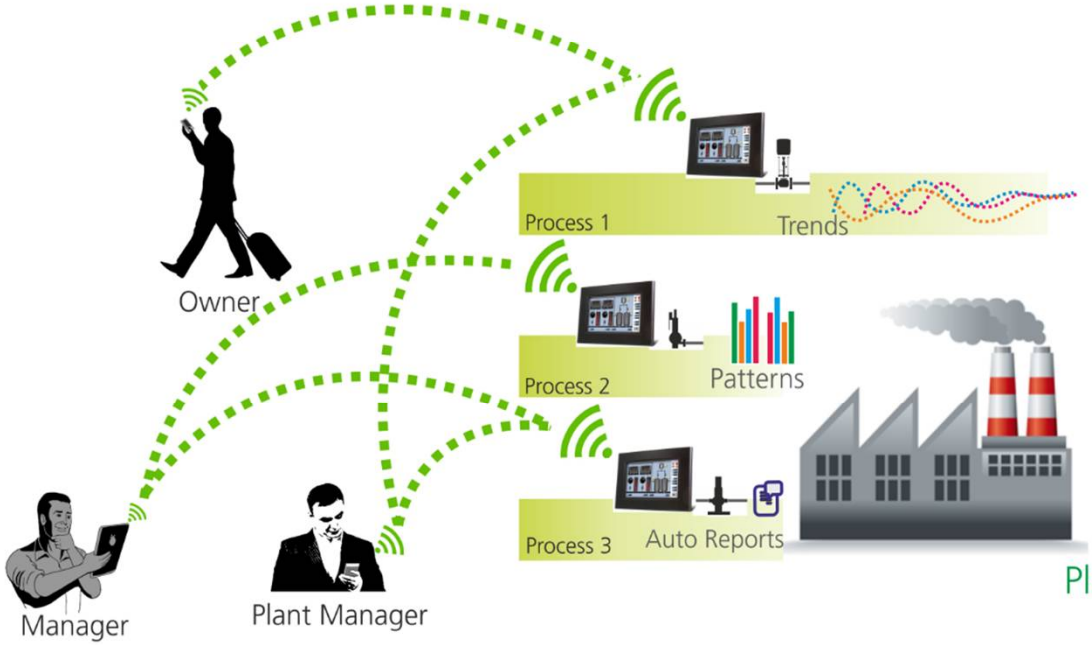


Scenario 1: Overview of Key Parameters

Before Eversense

No insight of the process
No control over production O/P
Lowered profits

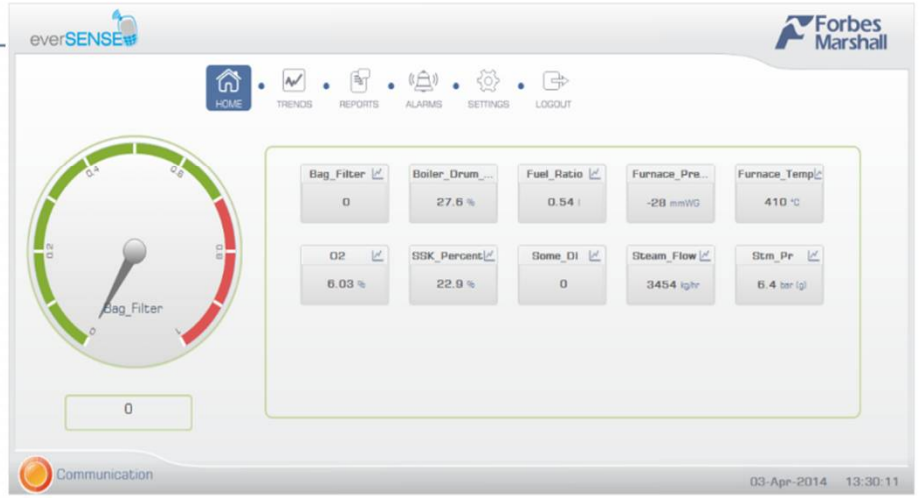




After Eversense

Complete control over process
Planned production under control
Higher profits

Key Screenshots :

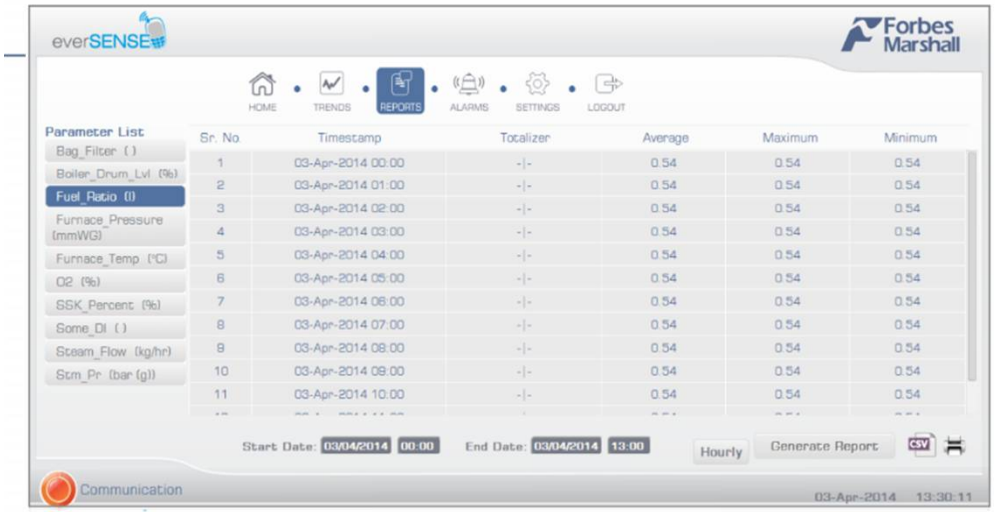


Dashboard

- Each critical plant parameter on one screen
- Updated in real-time

Trends

- View trends for any combination of parameter
- Discover hidden patterns in your data

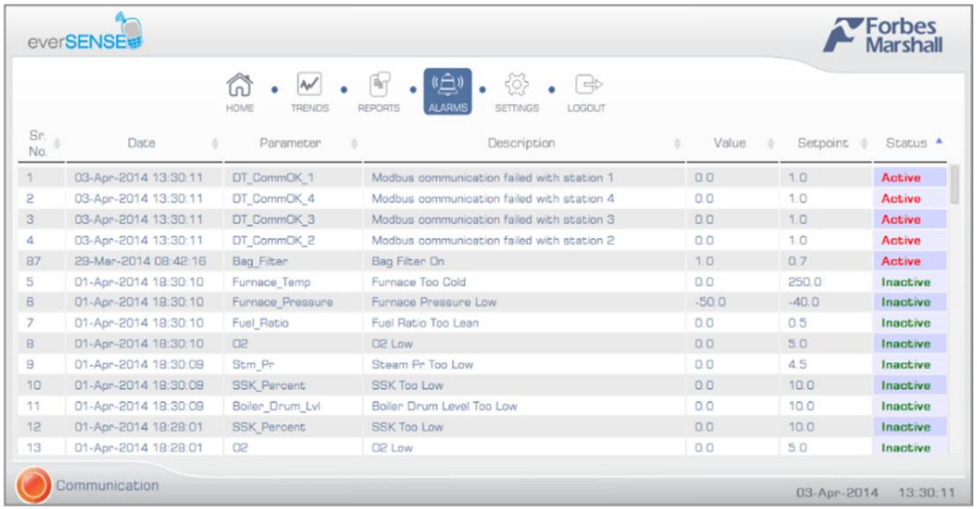


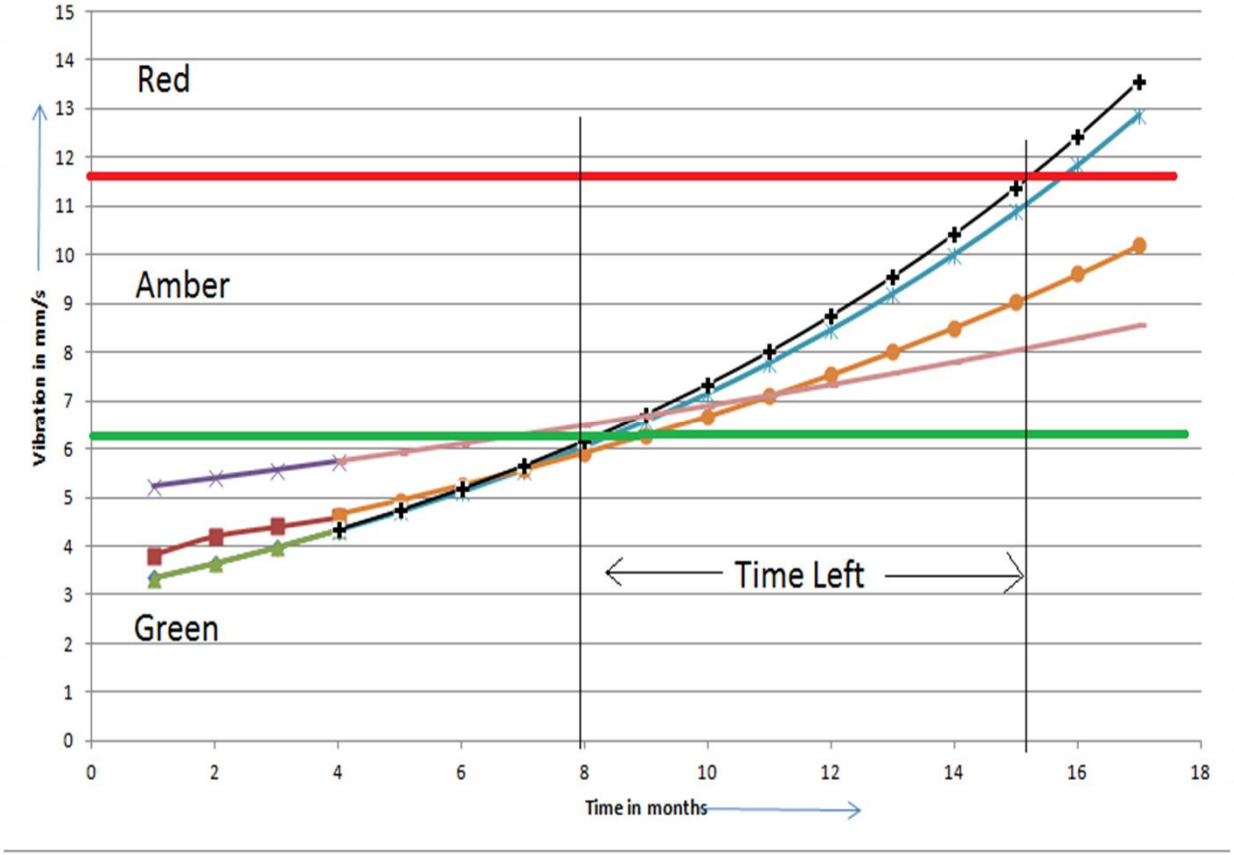
Reports

- Customizable by timespan
- Export data to Excel or print

Reports

- View active alerts
- See historical alerts and see the time taken to rectify any alerts

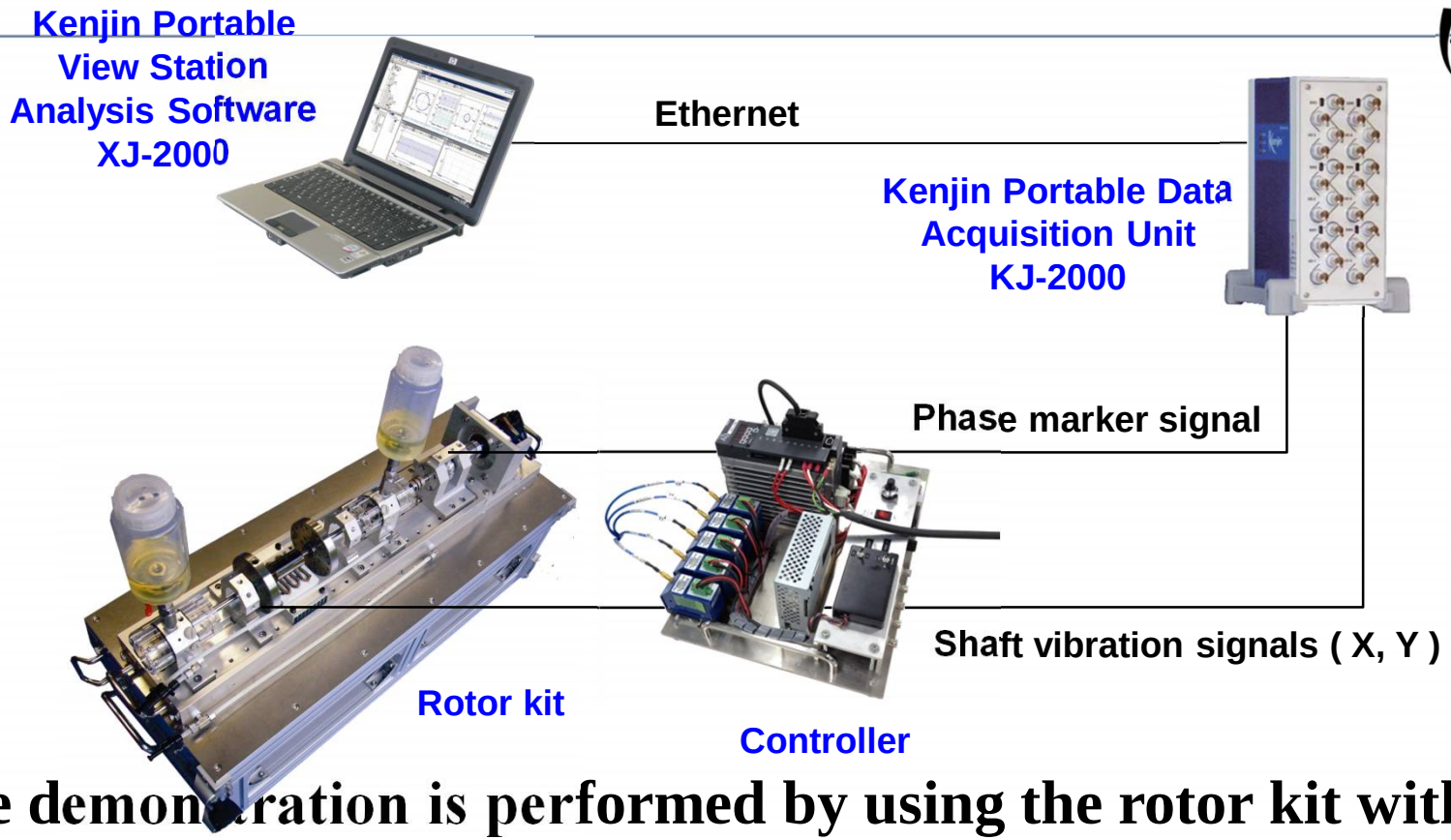



Red
Amber
Green
Time Left
Vibration in mm/s
Time in months
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0
2
4
6
8
10
12
14
16
18

- **Build More VMS Experts**


DANGER
Weight : 18kg
DANGER
Place the protection cover before operating

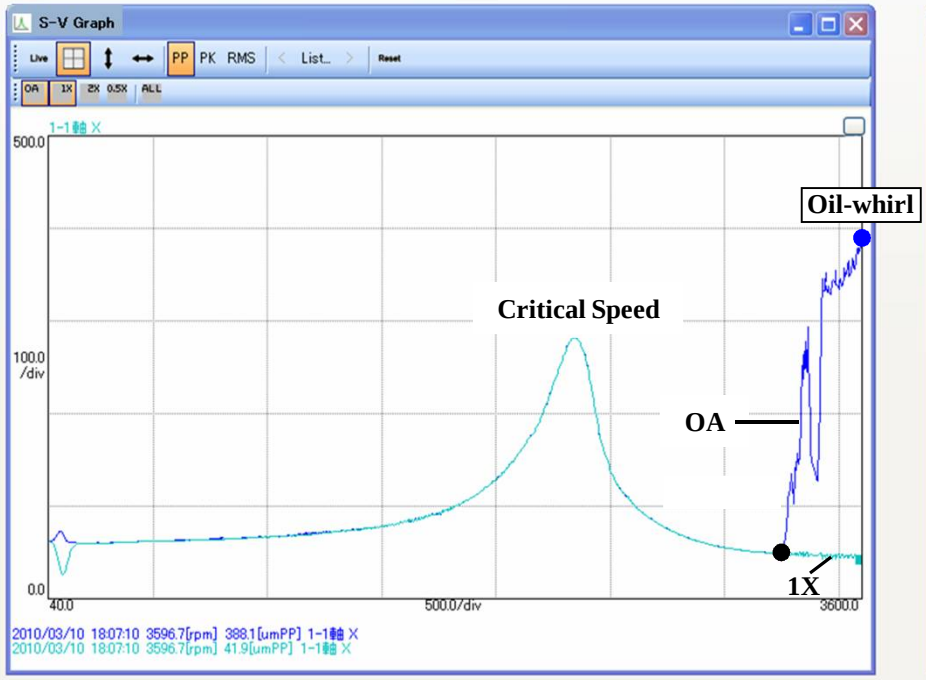
Demonstration of Vibration Analysis

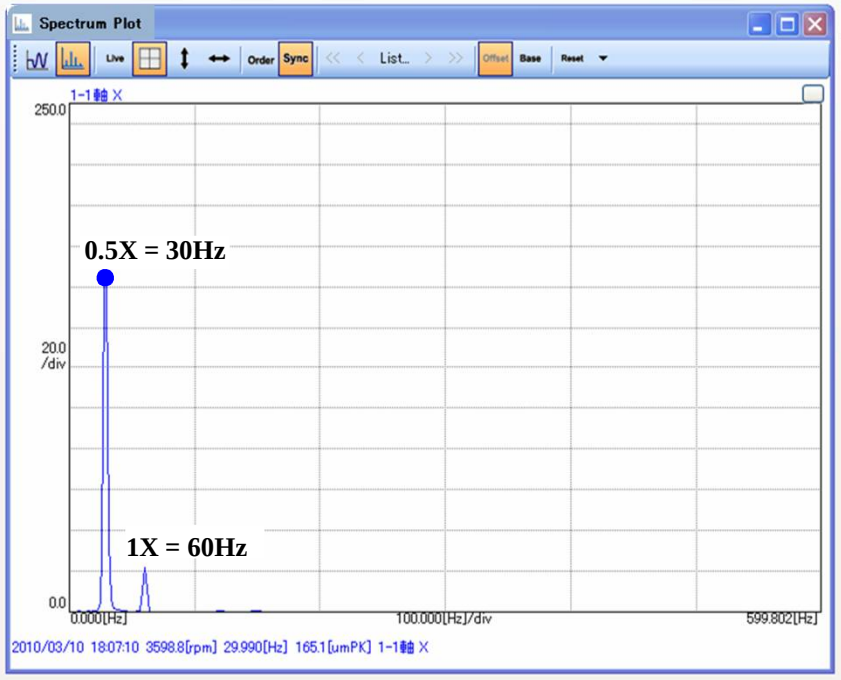


The demonstration is performed by using the rotor kit with plain bearings (journal bearings) and the Portable Vibration Analysis System “Kenjin”.

Abnormal vibration phenomena are generated by the rotor kit, and the Kenjin collects the data and displays analyzed data in real time.

Demo 1 : Oil Whirl Vibration (Analysis plots)





- **What is oil whirl vibration?**

  Oil whirl vibration is self-excited unstable vibration which is unique to rotating machinery supported by journal bearings. It can be induced in several conditions such as shape of bearing and oil film characteristics.

  The characteristics of this phenomenon include that it occurs at a speed less or equal to 2 times the first critical speed, and that the frequency is half the rotation-synchronized frequency component.

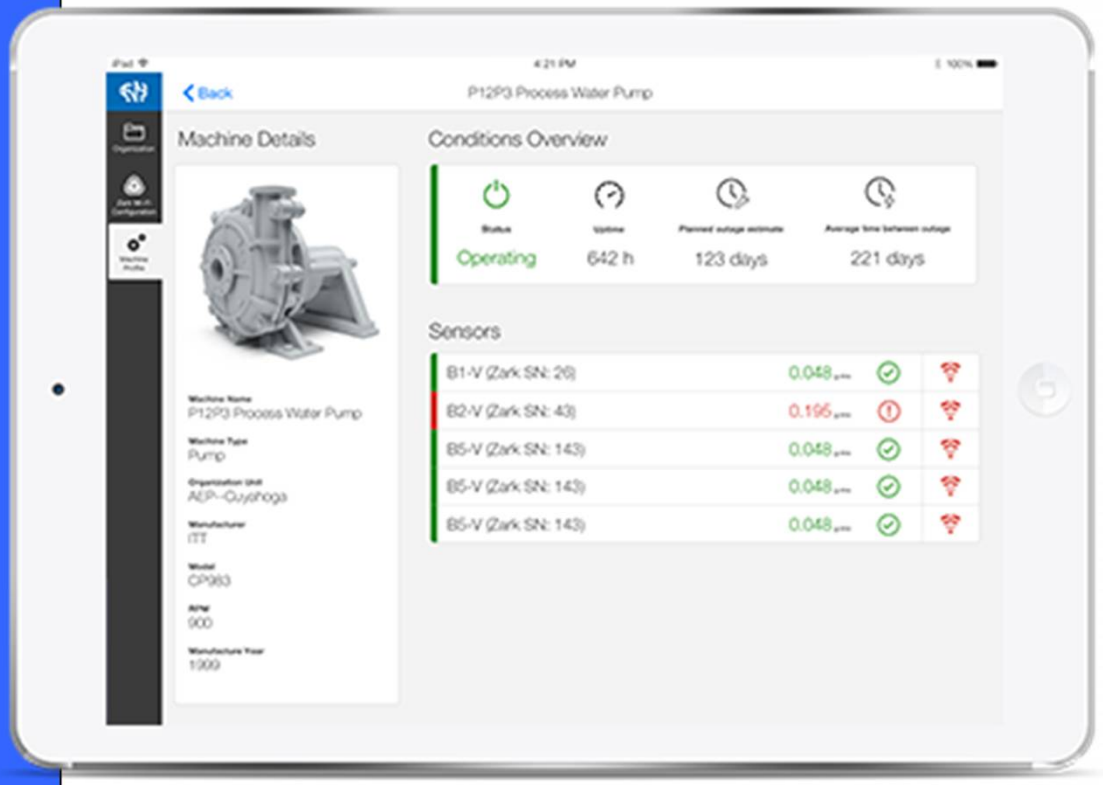
- **Upcoming VMS Solutions..**

Future Technology in online VMS for non critical machines….

- Vibration Velocity Sensors without power supply…..
- No Field Cable……
- Can carry signal up to 1 KM…
- No Need of Monitoring System…..
- Direct Vibration Analysis System interface…& OPC to DCS.
- Cloud Based Sensors…& Software

mvyas@forbesmarshall.com

New Release : April 2017



ARTU

Key Applications :
Balance of Plant Applications
For Pump/Fan/Motors

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Conclusion

1. Ammonia Resistant Probes : Specially Made for Longer Life : 5 Year + (Replaced old Probes at Many Locations)

2. Right Size Right Cost with Better Service Support.

3. Cloud Based VMS Solutions saves the cost and give experts advise to increase uptime.

4. Remote Monitoring of Plant with Cat IV Certified Experts.

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Thank You