



ISA Delhi Section

*Setting the Standard for Automation™*

# FERTILIZER MEET 2017 16<sup>TH</sup> DECEMBER 2017

## FORBES MARSHALL

### Sanjay Kumar

The International Society of  
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# Fertilizers Industry

## Machinery Protection for Critical Process





# Shinkawa System in KRIBHCO- Krishak Bharati \* Case Study

- In India there are some sectors like refineries, fertilizers which are highly dominated by Top most global Vibration Monitoring manufacturer. Reason is the process environment. Fertilizer plants generally equipped with different compressors like ammonia compressors, synthesis gas compressor CO<sub>2</sub> compressor, carbamide pumps which is having highly Harsh as well as corrosive gas environment. Any unscheduled shutdown/breakdown can do the unlimited process loss . The displacement probes ,transducer system using for these critical process machines should be reliable as well as should have high quality.



# Shinkawa System in KRIBHCO- Krishak Bharati \* Case Study

- KRIBHCO is one of the big fertilizer manufacturer & government undertaking company using the vibration monitoring system which was un supported & old obsolete. Hence finally user decided to revamp the system . Our site representatives always exploring the several product range & fortunately Mr. Jitendra who looking the area business got the information. User knows about the shinkawa system which is having lot of installations in the power plants but there was little bit hesitation to incorporate Shinkawa name in most critical equipment like ammonia compressors etc.



# Shinkawa System in KRIBHCO- Krishak Bharati \* Case Study

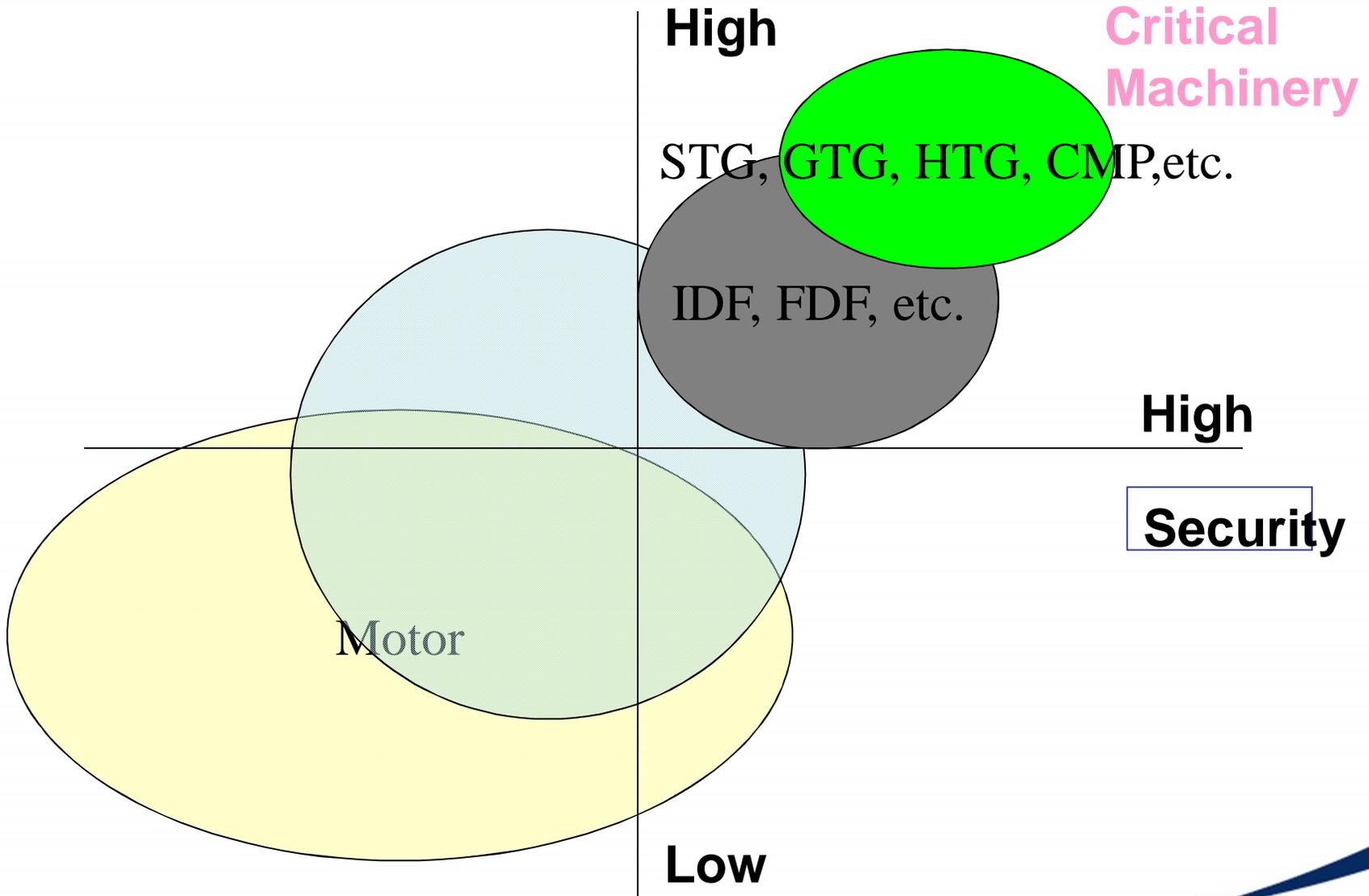
- We from Division immediately rushed to the site , we convince user & collect the minimum information but still user was having doubt which we cleared immediately after demo. We conduct test with our FK series transducer set at site, user is highly technical and they have checked the results on the calibration kits & finally satisfied with the result. Last question was its reliability in ammonia compressor, we have given some references in India who are very much satisfied with Shinkawa anticorrosive probes coming under “geo” specs.



# Shinkawa System in KRIBHCO- Krishak Bharati \* Case Study

- Finally KRIBHCO given us enquiry, we again visited site studied complete system & understand the user requirement. We won the tender.
- We are happy to see our two years continuous effort comes finally with good result. We are not looking this project as a order but it is a good breakthrough in Indian fertilizer sector.
- We really thanks to “Shinkawa “for their full featured VM-7 series Monitoring system as well as innovative FK series transducers sets. Again “API 670” helps us to evaluate our monitoring system with the existing systems.

# Security vs. Maintenance Cost



# API 670 Machine Protection System



- 19-inch Instrument Rack
- 11 Monitor Modules / Rack
- 4 CH / Module (Vibration)  
6 CH / Module (Temperature)
- Max. no. of channel in a rack  
→ 44 CH (Vibration)  
→ 66 CH (Temperature)



VM-7 Series Monitor

# Machine Protection System Features & Advantages



- Multi channel Module – 4 Ch – Vib / Displacement & 6 Ch Temperature Monitor Module.
- Up to 40 Channel in 1 19' Rack
- Simple & Flexible System – 16 Types of Parameters with 4 Types of Monitors only.
- Configurable by PC
- 6 Relays in Each Monitor By Default.
- Hot Replaceable Modules.
- Redundant Power Supply , Host Network with 100 Base T ( Ethernet / Modbus ) communication Ports.
- Comply with API 670.

# Machine Protection System Features & Advantages



## Universal Monitor Module :

### VM-701B Displacement / Vibration Monitor Module

- Configurable Monitoring Parameters:
  - Displacement Vibration (Shaft Vibration)
  - Velocity Vibration (Seismic Vibration)
  - Acceleration Vibration (Casing Vibration)
  - Dual Path Vibration
  - Thrust Position (Axial Position)
  - Differential Expansion (Single input)
  - Ramp Differential Expansion
  - Complementary Input Differential Expansion
  - Case Expansion / Complementary Expansion
  - Case Expansion
  - Valve Position
- Transducer Input: up to 4 CH
- Phase Marker: 1 CH (Option)
- Programmable Alarm Relay: 6 CH

Users can program AND/OR and special alarm logic with any channels of any modules within the rack.

# System Configuration



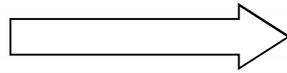
PC for Local Display

Ethernet

- PC



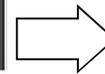
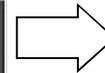
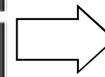
Network Comm.  
(Redundant System Available)



USB  
Local  
Communication



Buffer output  
BNC on front panel,  
and terminals at the  
back



Single/Dual  
Power Supply  
AC

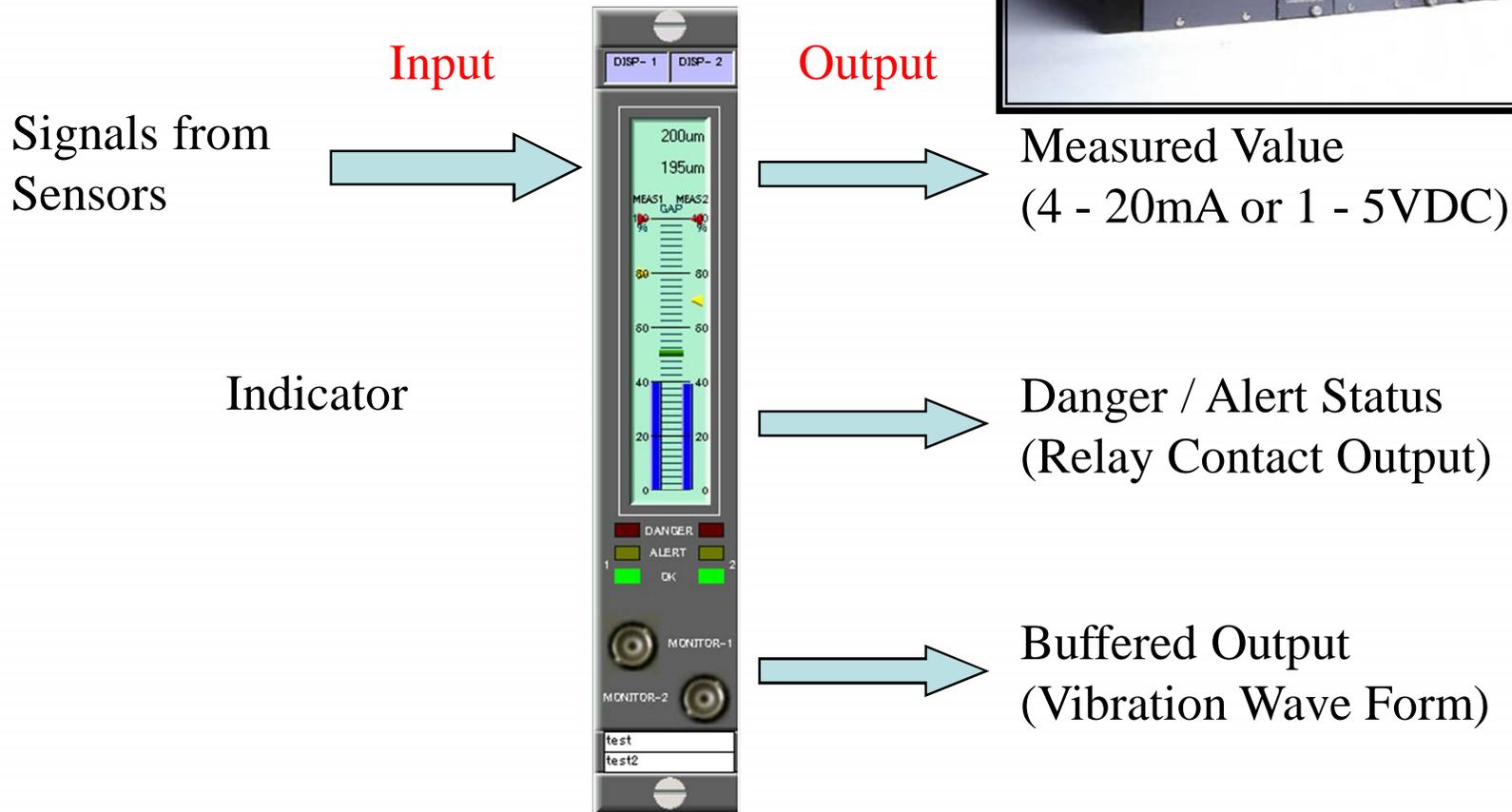
Phase Mark × 4 ch (RD, FK)

Transducer Input max 44ch  
(VK, FK, CV, CA, RD, MS)



# Primary Functions of VM-5 Series Machine Protection System

**Dual Channel Single Instrument Rack  
with inbuilt power supply for Vibration  
& Axial Measurement on Critical M/c  
8 & 10 Slots Rack Monitor  
Single / redundant power supply**



# Proximity Probes System Solutions



**Complete line of eddy-current probes  
Complies with API-670**

Probe types include:

Metric or UNF Threading

5mm, 8mm, and 11mm vibration probes

Straight, reverse mount, and thrust probes

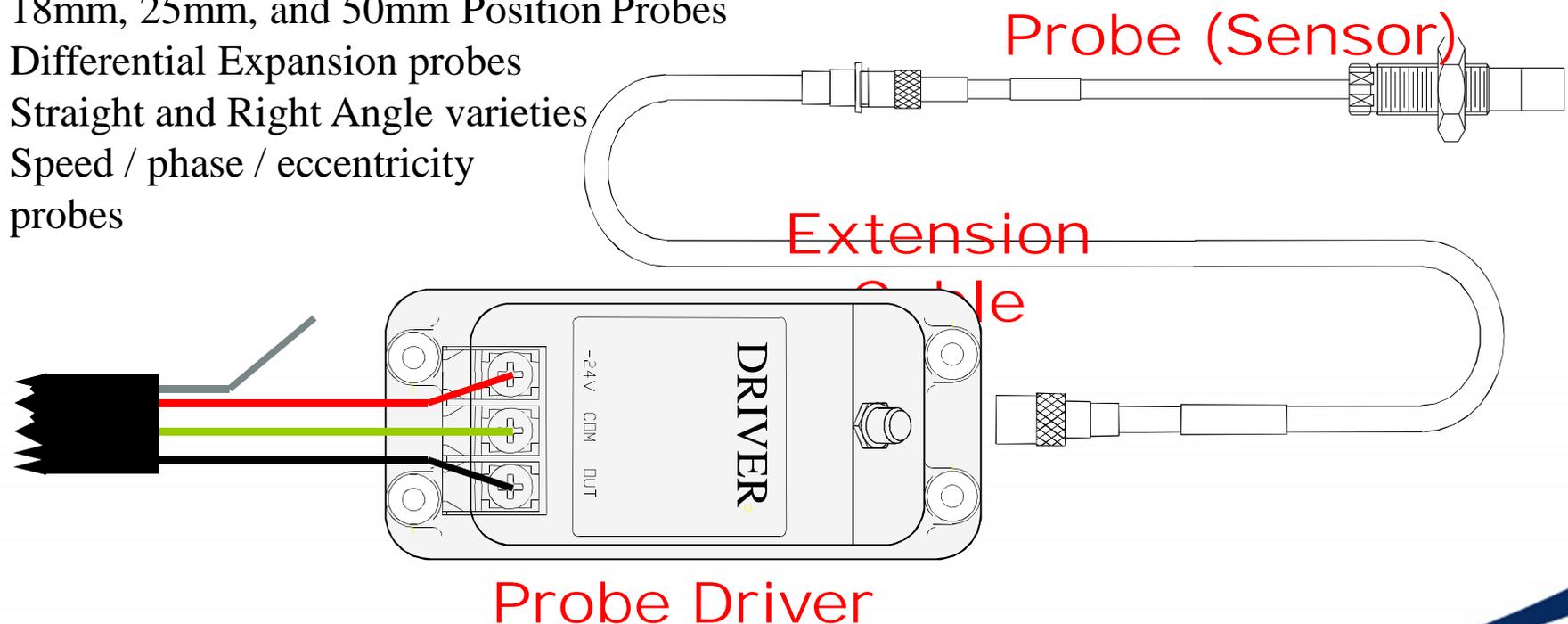
18mm, 25mm, and 50mm Position Probes

Differential Expansion probes

Straight and Right Angle varieties

Speed / phase / eccentricity

probes



# Transmitters & Machinery Analysis Solutions

- Single Channel
- Casing Vibration
- Shaft Vibration
- Speed
- Axial Position
- LVDT Input

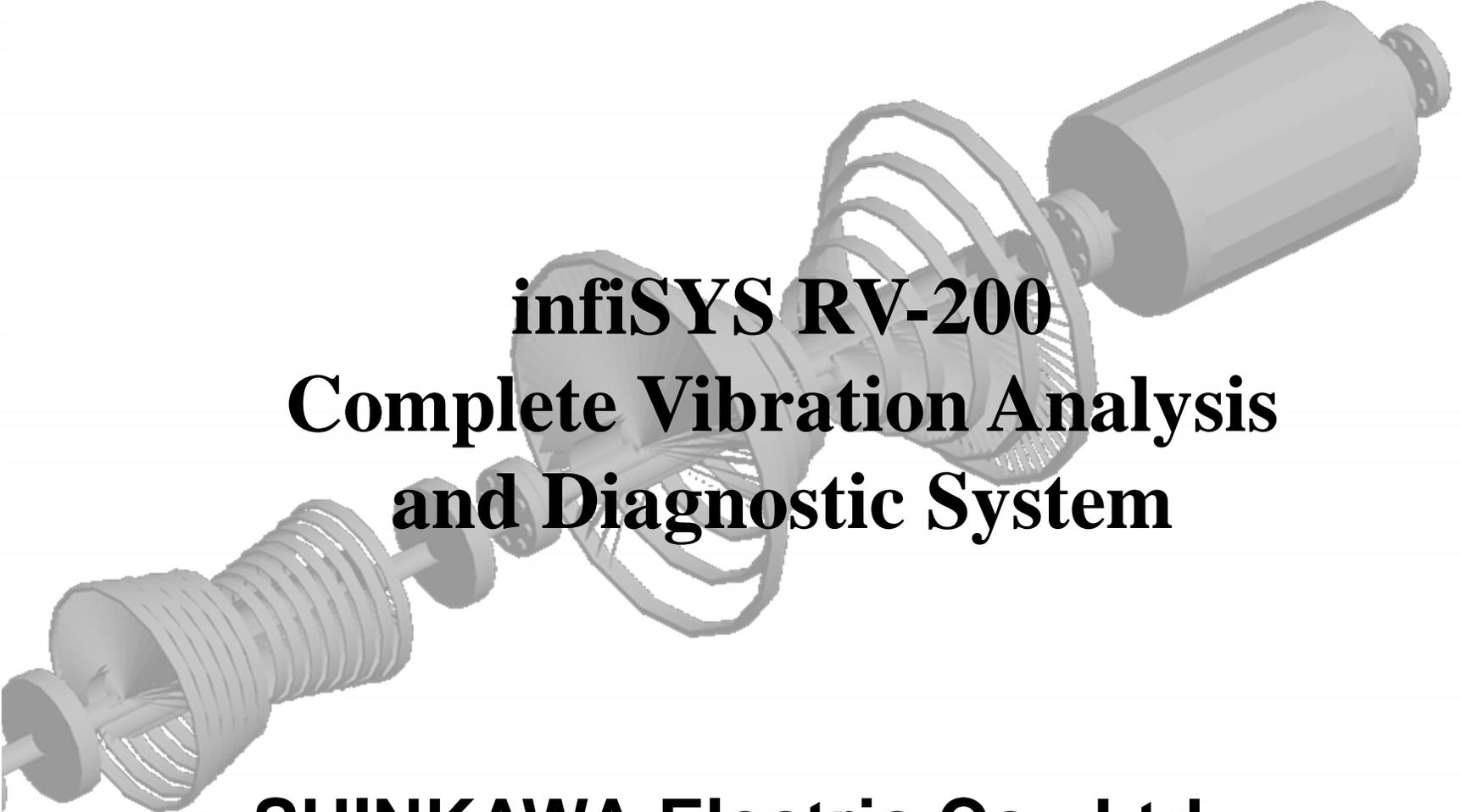


WK Series Solution



24 Channel Portable Unit

# RV 200 Infisys Analysis Software

A detailed 3D CAD rendering of a vibration sensor assembly is shown in a light gray, semi-transparent style. The assembly includes a cylindrical base, a central shaft with a spring, and a top section with a mesh-like structure. The text is overlaid on this image.

## **infiSYS RV-200 Complete Vibration Analysis and Diagnostic System**

- **SHINKAWA Electric Co., Ltd.**



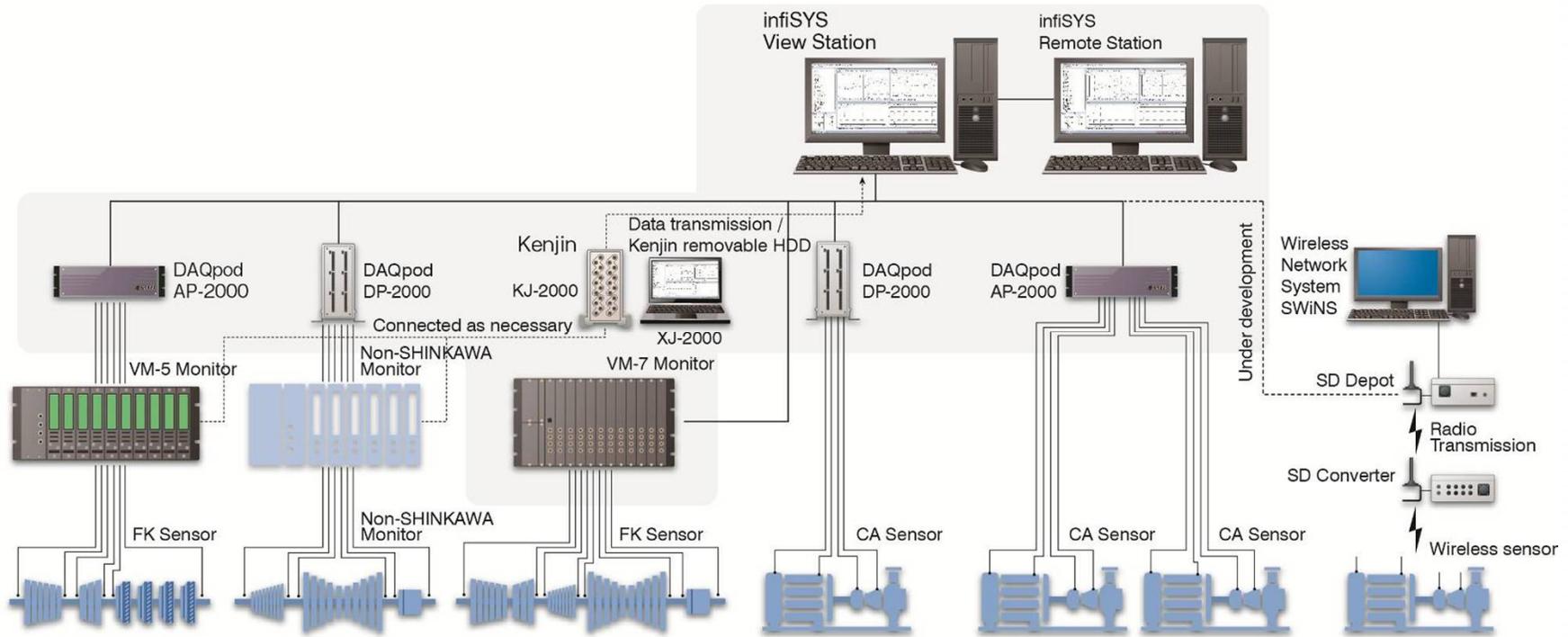
# infiSYS RV-200 Complete Vibration Analysis and Diagnostic System

- This is a vibration analysis and diagnostic system that fits a range of rotating machinery of all sizes, from small machinery with rolling-element bearings to large machinery with journal bearings.
- For large rotating machinery, based on the vibration waveform measured with shaft vibration sensors, it monitors vibration during rated speed rotation, analyzes fault vibration, as well as behavior during startup and shutdown.
- For small rotating machinery, based on the vibration measured with acceleration sensors installed near the bearing housing, it monitors overall vibrations, trends of vibration of each characteristic frequency related to bearing fault and diagnoses the fault.

# System Configuration

- For large rotating machinery, VM-5 or other commercial monitor are used. In this case, the system completes with an analysis data acquisition unit DAQpod to input buffered signals from the vibration monitors.
- For large rotating machinery, VM-7 monitor is used. In this case, the system completes with analysis-board-installed VM-701B vibration monitor module to directly connect via Ethernet.
- For small rotating machinery, monitoring of bearing vibration with acceleration sensors. In this case, as the analysis data acquisition unit DAQpod supplies power for acceleration sensors, the sensors can be directly connected to the DAQpod.

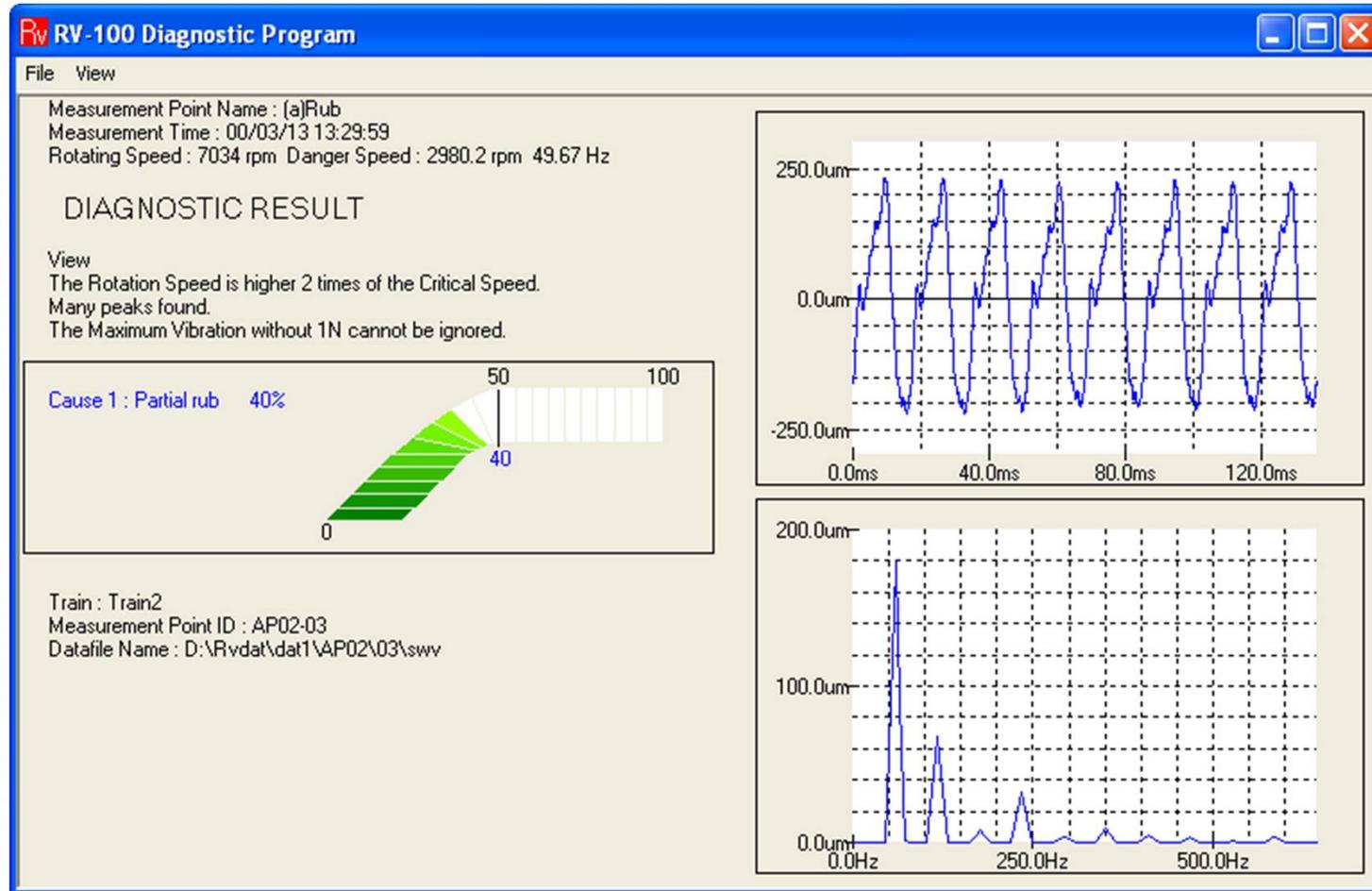
# Vibration Analysis and Diagnostic System with Remote Monitoring



**Fertilizer Plant Critical Equipment**  
 (Turbines, Power Generators, Large Compressors)

**Non – Critical Equipment/Auxiliaries**  
 (Pumps, Gears, Motors, Fans etc.)

# Diagnostic Result



# MPS & Infisys Analysis Software Capability

- Shinkawa VM 7 system is latest generation system and it is at initial phase of product life cycle So no need upgrade Soon.
- VM 7 has very few variants of hardware to meet overall VMS/MCM/TSI requirement – Less spare inventory & more reliability. Life cycle cost to maintain the product is very low.
- VM 7 with Infisys Analysis & Diagnosis software, it is an open system. It is possible to interface to any third party Sensors, Monitors to the software by using interface units.



# MPS & Infisys Analysis Software Capability

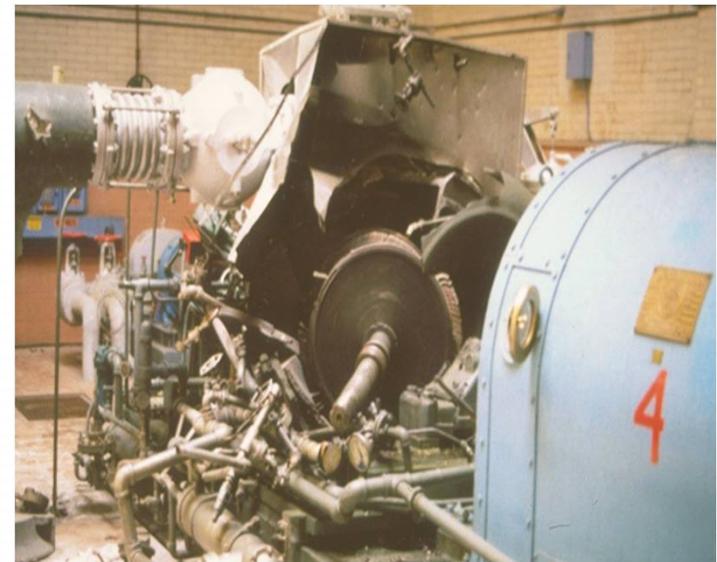
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- Shinkawa RV 200 Infisys has single license No Tag wise license for 480 Sensors / 20 Racks So cost saving solution.
- Easy to Operate / user friendly System having all plots / graphs available for Analysis Purpose
- Capable to Connect with third Party Monitoring System using interface



# Machine Protection System requirement

- \* 24X7X365 Monitoring of Critical Machine Pump, Compressor, Turbine etc. and alarm information for high Vibration more than the limit
- Safety of Machine and set trip which automatically shutdown the machine on Vibration more than the limit for that machine
- Safety of Man Power
- Maintenance cost reduction
- Increasing Machine Availability
- Increasing Machine Life





# Retrofits & Upgrades Capability

- Shinkawa Monitor is capable to connect with existing Sensors / Probes on Machine
- Shinkawa Sensors / Probes are capable to connect with any third party Monitor
- Shinkawa RV 200 Infisys Analysis & Diagnostic Software is capable to connect with any third Party Vibration Monitoring system
- Simple installation Procedure and better Service Support, Commissioning
- Level-2, Level-3 Certified Vibration Analyst are available for Analysis & Condition Monitoring Support



# FM-Shinkawa Installations

1. IFFCO Phulpur
2. Kribhco Surat
3. RCF Thal
4. Coromandal Fertilizer
5. Zuari Fertilizer
6. NFL Vijaypur
7. ZIA Fertilizers Ashuganj
8. Urea Fertilizers Bangladesh
9. Many more global references.....



## Key Customers & Approvals

- IFFCO, Kribhco, RCF, Juari Fertilizers, NFL, EIL , NTPC, BHEL, Siemens, Triveni, Mitsubishi, Toshiba, Neuman, Flowserve, KSB, Sulzer, Dressar Rand, Toyo, Jacob, UHDE, IOCL, BPCL , HPCL, BORL , RIL , CPCL, BRPL, Essar and so on with 3000 customers in India.
- Approvals : PDIL, EIL, IFFCO, RCF, KRIBHCO KSFL, JUARI FERTILIZERS, Ramagundam Fertilizers RFCL, COROMANDAL FERTILIZERS, ZIA FERTILIZERS, GSFC, UREA FERTILIZERS, IOCL ALL REFINERIES PROJECTS, HPCL, ONGC, TOYO, UHDE, TECHNIP, HOLTEC, TCE, DCPL, NTPC and All Consultants & Electricity Boards.

# Machine Condition Monitoring

- **Non-Critical Machines in Fertilizer Industry**



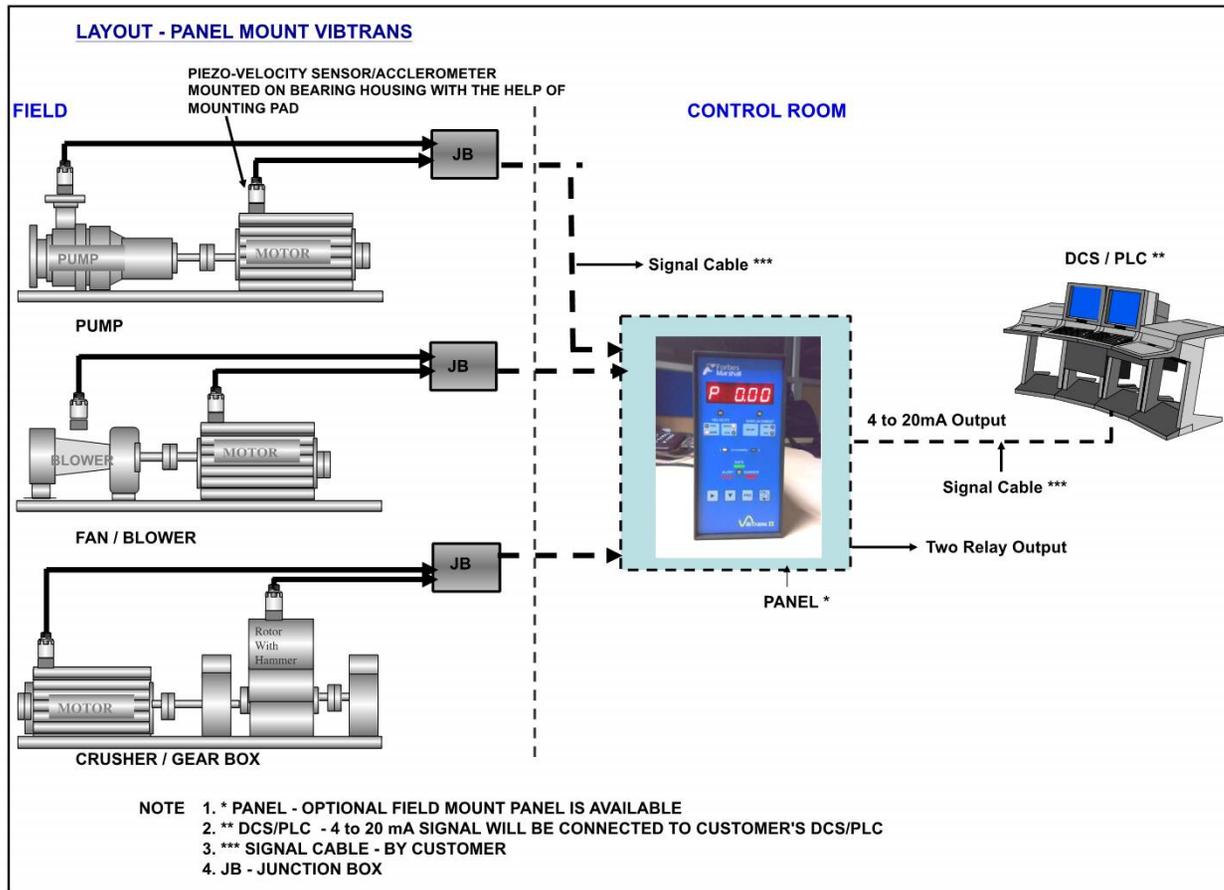
# Non-Critical Machine Protection Solution

- FM – Multi 42 Ch. Channel Monitor
- Redundant Power Supply (84-264 VAC / 24, 110 VDC)
- 2 Ch. Accl. / Velocity Modules
- RS 485, TCP/IP Comm.
- 4-20 mA Per Channel
- 02 Relays each Channel
- Up to 08 Nos. Phase Markers
- 02 Buffer Output each Channel for Analysis Purpose

FM-VibTrans Rack

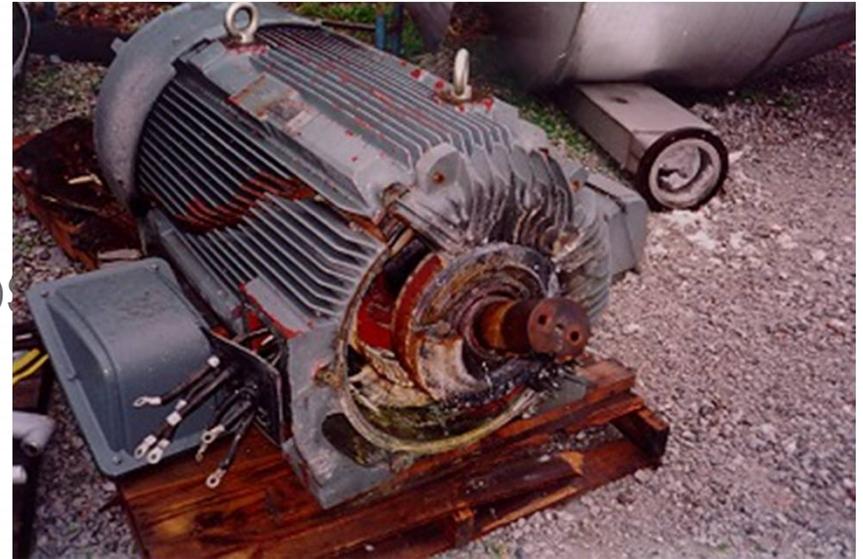


# Non-Critical Machine Protection Solution



# Non-Critical Machine Monitoring requirement

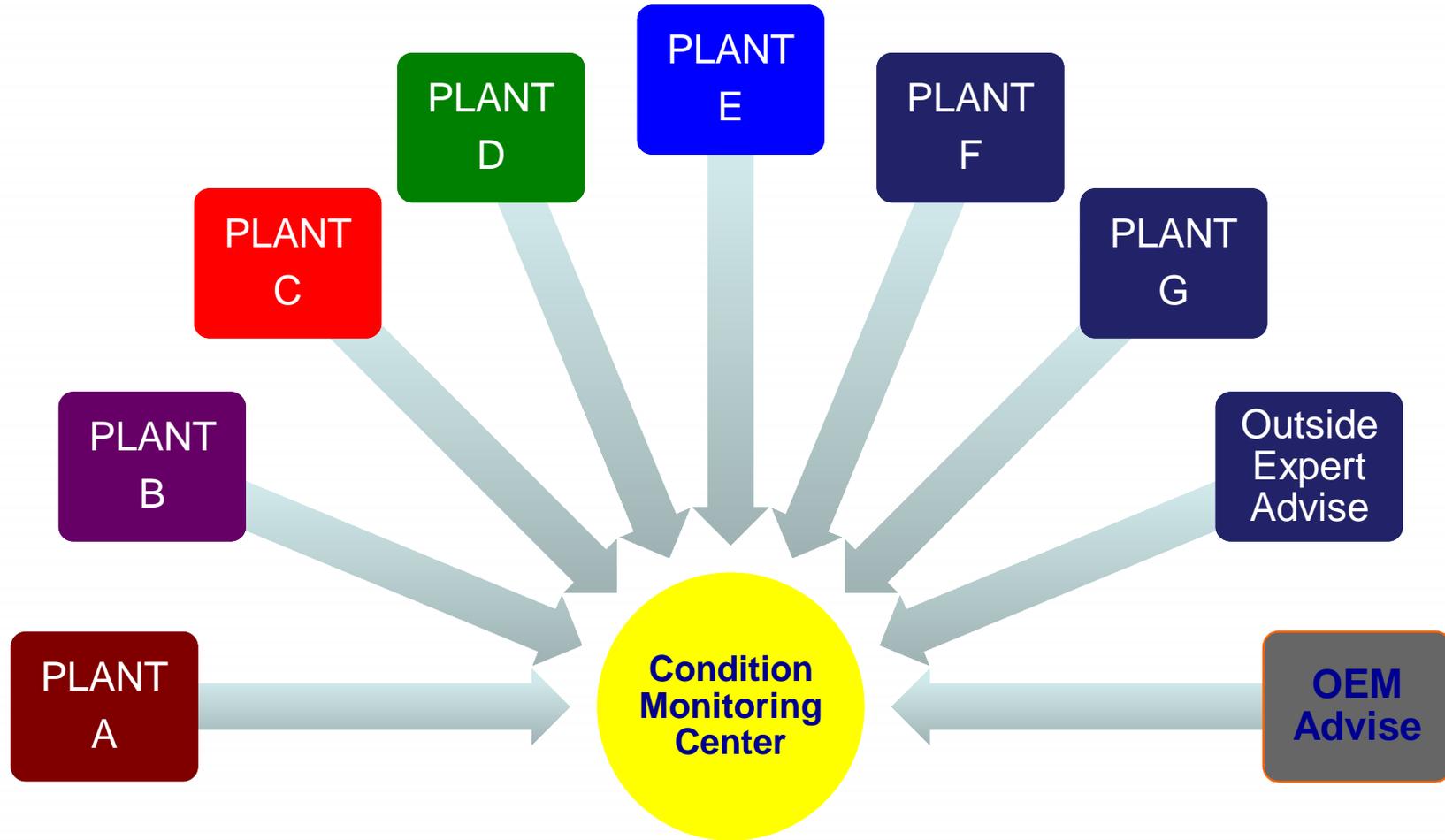
- Can prevent the machine
- Increase the machine life
- Save the Maintenance cost
- Save the Man power
- Increase the machine availability
- Increase the Profitability



# Advantage of Vibration Monitoring

Failure Mode	Unbalance	Mis-alignment	Abnormal Roller Bearing	Abnormal Sleeve Bearing	Abnormal Speed Reducer	Looseness	Feature
Pressure				○			No change in a minor failure
Flow				○			No change in a minor failure
Temperature		○	○	○			Slow Response
Oil Deterioration			○	○	○		Lab use
Vibration	○	○	○	○	○	○	Effective for many root causes

# Central Condition Monitoring of Plant Machines





# Online Analysis System Advantages

- Various Machines / Plant Areas can be Connected at One Common Condition Monitoring Center
- Less Expert Manpower required
- 24x7 Machine info Available at one place
- Machine health info by Alerts – Fast Info Movement
- Machine History Availability for better Analysis
- Perfect Utilization of Time for Analysis & Decision Making for Corrective Action
- Enable to take Immediate Action on Time to Save Machine
- OEM / Outside Agency Expert Advise possible Remotely to Save Time and Cost also.

Thank You

