Other Measures for Reliability enhancement(Contd)

- Also an Isolation Transformer has been installed on Township Feeder to avoid heavy electrical faults in Township Over Head Line to propagate to GTG.

- Underground cables are now laid to connect about 1.5 to 2MW of Township load. Only bore-wells (about 100KW) are still on overhead cables.

- Township load is now put back on GTG.

- Old Analog AVR (Automatic Voltage Regulator) of GTG-1 is replaced by new Digital AVR. This was already planned earlier.

Case-A. Trip of one GTG -- Optimum usage of Power to sustain Ammonia plants

Load on UPPCL (Description)	KW	Load on GTG (Description)	KW
Township-2&1	1150	PH Plant Feeder 4XA	200
Non Plant Bldg 5XB&5XA	500	Urea-1 CW pump 08MP01B	1100
PH Plant Feeder 4XB	250	BFW Motor GA-101C (P. Plant)	1000
Borewell FDR-2&1	250	Urea-2 CW Pump MP4801B	1300
Raw water Feeder 2XB& 2XA	684	New 3.3 KV Switchboard of CEP S/S I/C-A&B	250
FIre water Feeder 2X C	210	Ammonia-1 MCC FDR 1&2	1200
CT Expansion feeder-2	500	Ammonia-1 3.3KV FDR-1&2	1000
DM plant Feeder 1 X D	800	MP1801B & C Amm-1	2250
		Ammonia-2 CW pump MP 3801C	1350
		Ammonia expansion feeder -1&2	5250
		Inst.Air Compressor Feeder 3XC	50
		Power Plant TR 1XB&1XA	100
Total	**4344**		**15050**
Overall Total			**19394**

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Case A-Trip of one GTG --the expected scenario and actions required at Urea plants

- All urea streams 11/21/31/41 will trip. (3.3 KV motors)
- Initially all motor driven CW pumps of Urea-I & Urea-II plants will trip. Immediately one CW pumps of Urea-I shall be started.
- Turbine driven CW pump of Urea-II plant shall be started immediately, if it was not running earlier.
- Ammonia-II CW turbine shall be started, if required, and one motor driven CW pump shall be stopped to conserve power,
- CO_2 Compressor of all urea streams 11/21/31/41will be on vent mode and kept on running. Power to LT motors (lube oil pumps and Condensate Pumps) will be available.
- Hence CO2 Compressors will not trip.

Trip of one GTG -- actions required at Power Plant, Utilities & Electrical

In-case any GTG trips, start command to both AMF sets will go automatically. It is required subsequently to oversee

its operation. If auto start does not take place then AMF set(s) will be started manually.

•Tripping of AMF set at high temperature of lube oil/cooling water shall be avoided by way of quick changeover within 5 minutes to fire water header.

• Turbine driven CW pump start shall be ensured for Ammonia-I & Ammonia-II plants.

•IGV of running GTG is to be put on manual mode and opened completely within 3 minutes time. This will make the machine suitable to take more load steps than specified for 4MW without getting tripped on high exhaust air temperature.

•Load setting of UPPCL to be kept at 10MVA. Feeders are to be managed as per table 3 above to save Ammonia plants

Case-B .Trip of both GTGs—Minimum UPPCL Power to sustain Ammonia plants

Ammonia-I		Ammonia-II		Other Plants	
Description	**Load(KW)**	**Description**	**Load(KW)**	**Description**	**Load(KW)**
All LT Motors	1255	All LT Motors	800	Power Plant Auxiliaries+ Lighting+ A/C	300
PGR	20	Inst.Air Compr	600	Off-sites-Auxiliaries+ Lighting+ A/C	100
AC +UPS	195	AC +UPS	200	Urea-I - Auxiliaries+ Lighting+ A/C	300
Lighting	200	Lighting	250	Urea-II - Auxiliaries+ Lighting+ A/C	300
CT fans (2Nos.)	160	CT fans (2Nos.)	160	PH - Auxiliaries+ Lighting+ A/C	200
Air Dryer	140	Air Dryer + off-sites	220	T/S & Bore-wells	1000
Total	**1965**		**2230**		**2200**
Overall Total					**6395**

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Trip of both GTGs -- expected scenario and actions required—Urea, Electrical

To ensure survival of both Ammonia plants on UPPCL power following scenario will exist.

- No power will be available to Urea Plants, hence all urea streams including cooling tower pumps and CO2 Compressors will trip.

- To take safe shutdown of the plant, emergency power supply to 11/21/31/41 MP24A/B, 11/21/31/41 MP25, barring device, 11/21/31/41MP-5A/B, 11/31MP-6A/B, 11/31MP-10A/B, 11/31MP-11A/B and Prilling Tower lift shall be made available.

- In case of tripping of both GTGs, we can draw power up to maximum 9 MW(10MVA setting) for a shorter period which may be helpful for the survival of both Ammonia Plants and handling emergencies. Further, it shall be reduced up to 4.5 MW manually, at the earliest possible after managing plant requirement.

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Conclusion

- The present up-gradation has been done without any investment at all. Rather innovative idea of hardwired connection was used to avoid the delays of old generation data highways and get the best within existing system itself.

Since the implementation of the first step of modifications itself there has been at least 03 occasions of trip of one GTG but no incident of tripping second GTG (total power failure) nor there has been outage of Ammonia Plants. In other words with the above modifications has been successful -- the reliability of the Power System of the complex has improved a lot.

Thank You

AK Bhaduri

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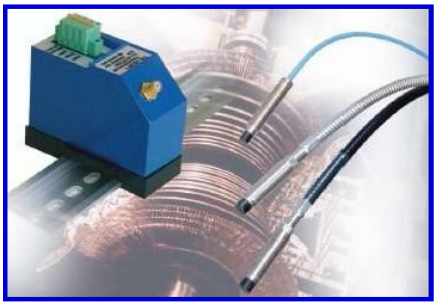


Vibration Monitoring A Case Study

By
Mukesh Vyas
Business Unit Head
Forbes Marshall

SHINKAWA

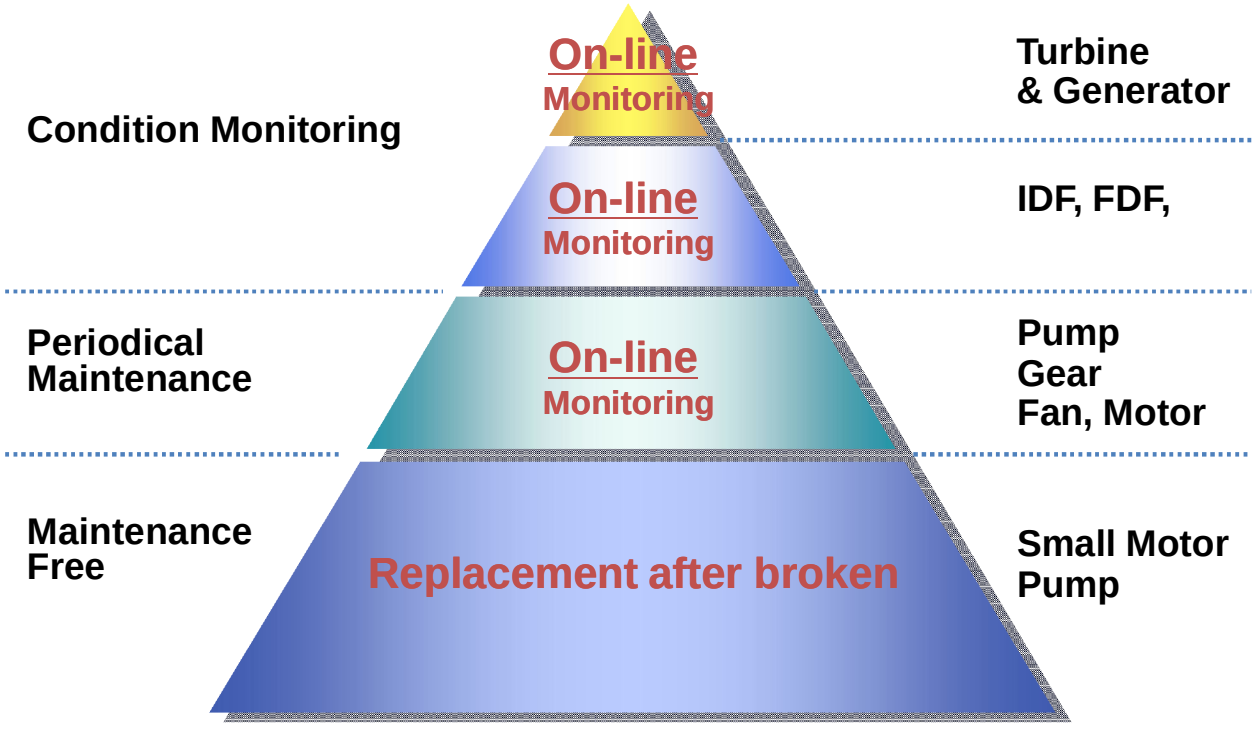
Agenda

- Introduction
- Current TSI , VMS & Analysis & Diagnosis System Scenario & Solution.
- New Solution for Power Plant TSI & VMS Monitoring.
- Remote Vibration Analysis – A Case Study
- Future of TSI , VMS & Analaysis Solutions.
- Conclusion

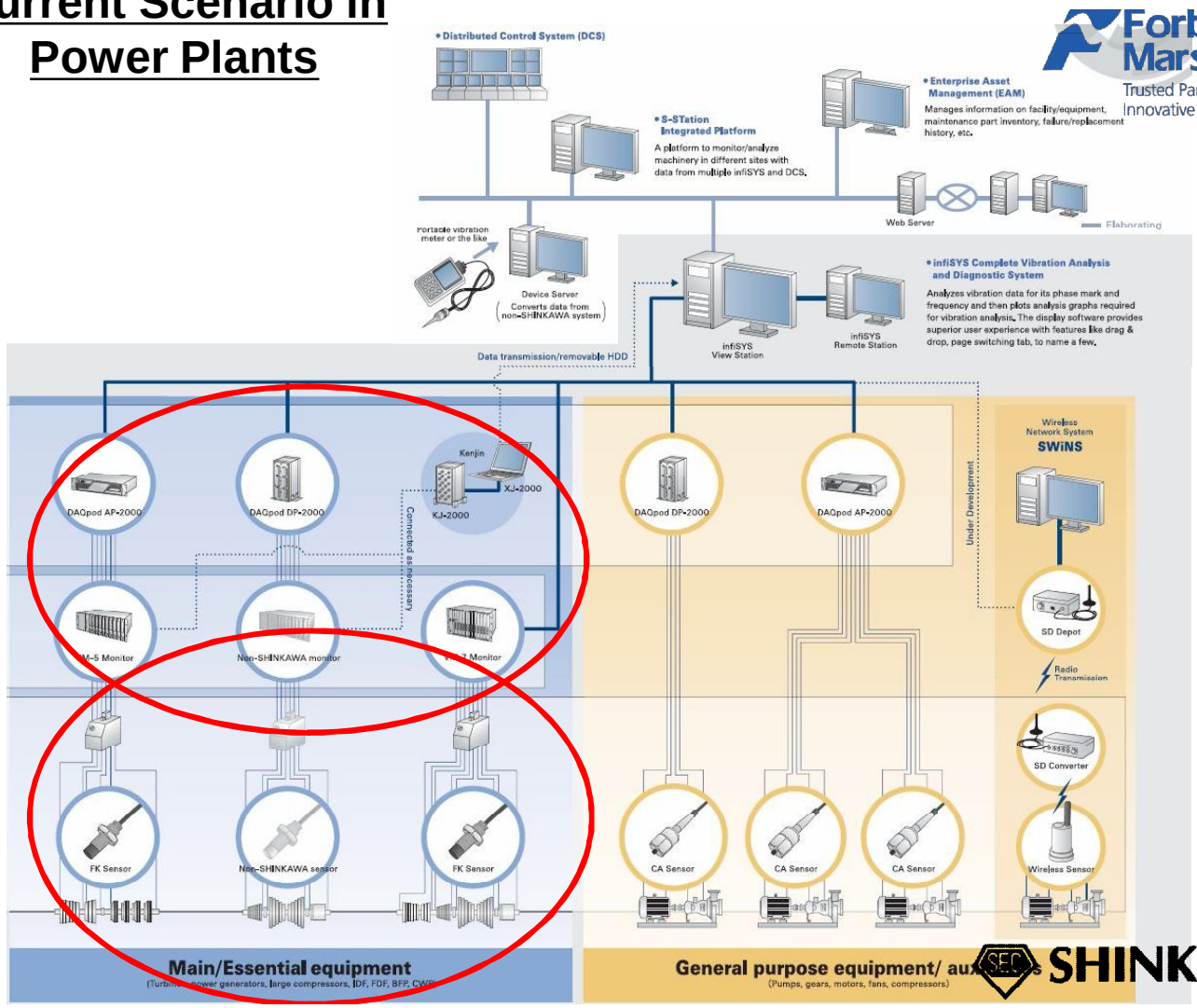
Forbes Marshall & Shinkawa Japan

- Rs 850 Cr Company, 1200 Members, 8 JV Companies with 27 Indian Branches & 15 Global Offices.
- A Leading Indian Company in Instrumentation & Steam Engineering Field.
- Key Products – VMS/TSI , SWAS, Codel Gas Analyser , Krohne Flow Meter , Arca Control Valves , FM – GGCB Valves , Gauges , DCS , Spirex Steam Traps , Boiler , FM-Solar
- Shinkawa Japan is a Leading Asian On Line & Off Line Vibration Monitoring & Sensors manufacturer having 2500 Customers in India.
- In India – 850 – Turbine TSI Users.....as a Market Leader in Power Sector.

Typical Classification of Machines



Current Scenario in Power Plants



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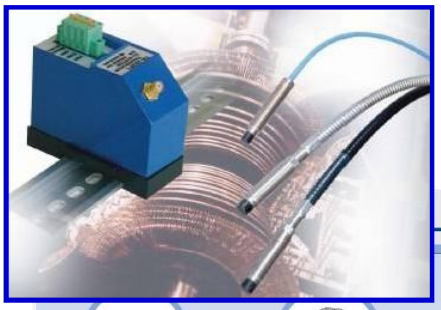
Entire System Configuration



FK Series Displacement / Vibration Transducer

VK Series Displacement / Vibration Transducer

CA Series
Acceleration Transducer
CV Series
Velocity Transducer

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Entire System Configuration

CMS Condition Monitoring System

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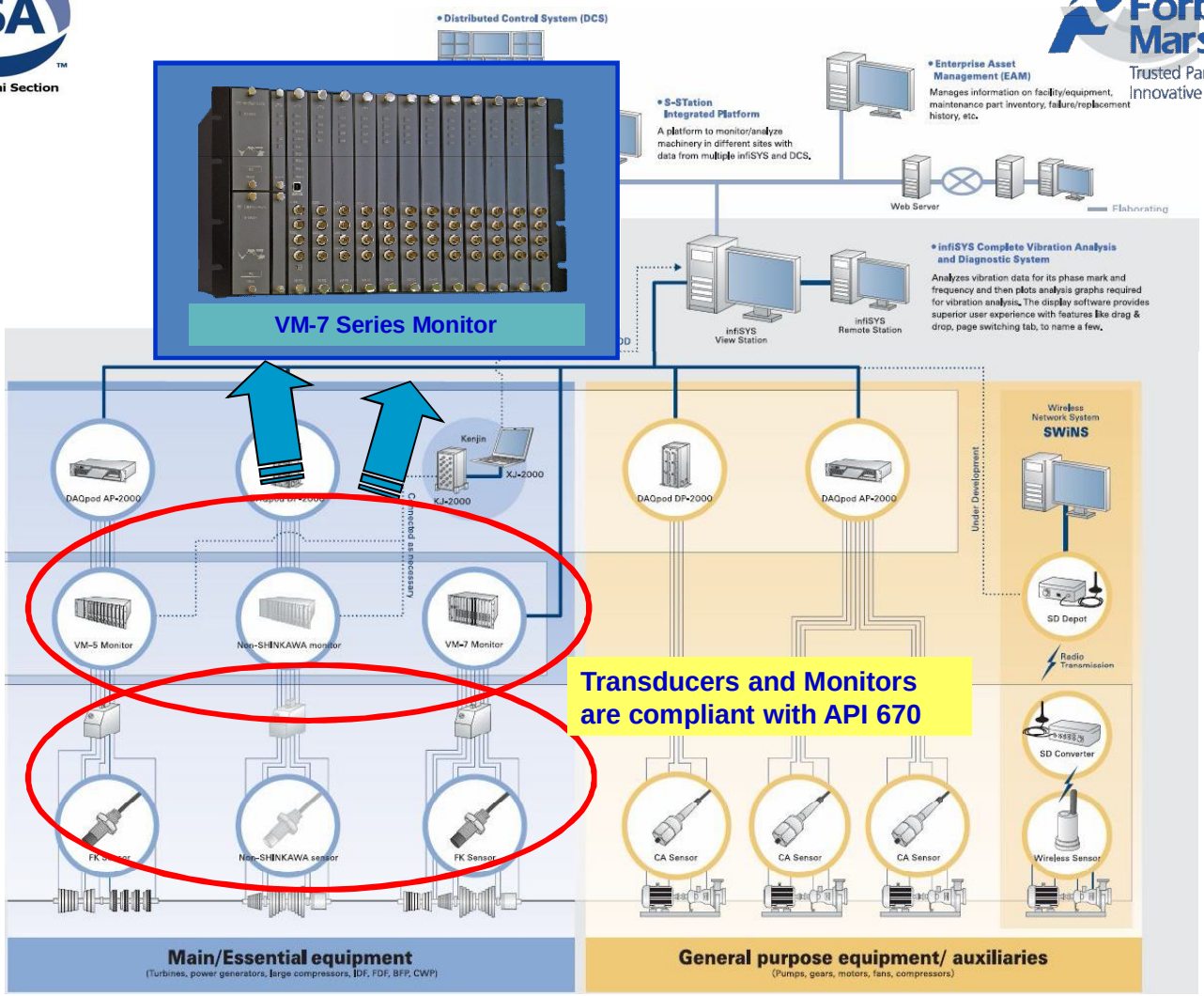
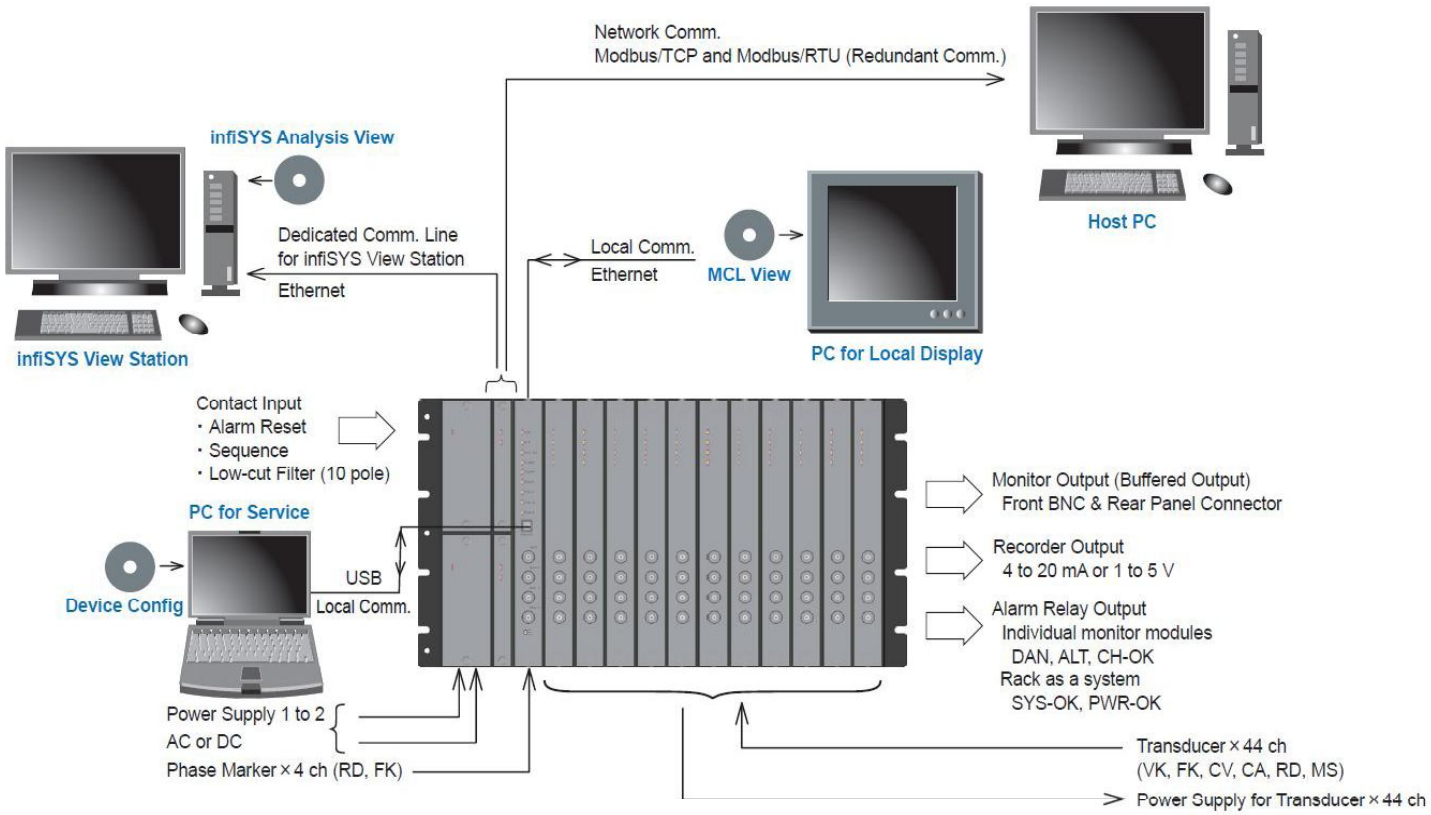


Typical System Configuration of API 670 VMS System



Typical System Configuration of API 670 VMS System

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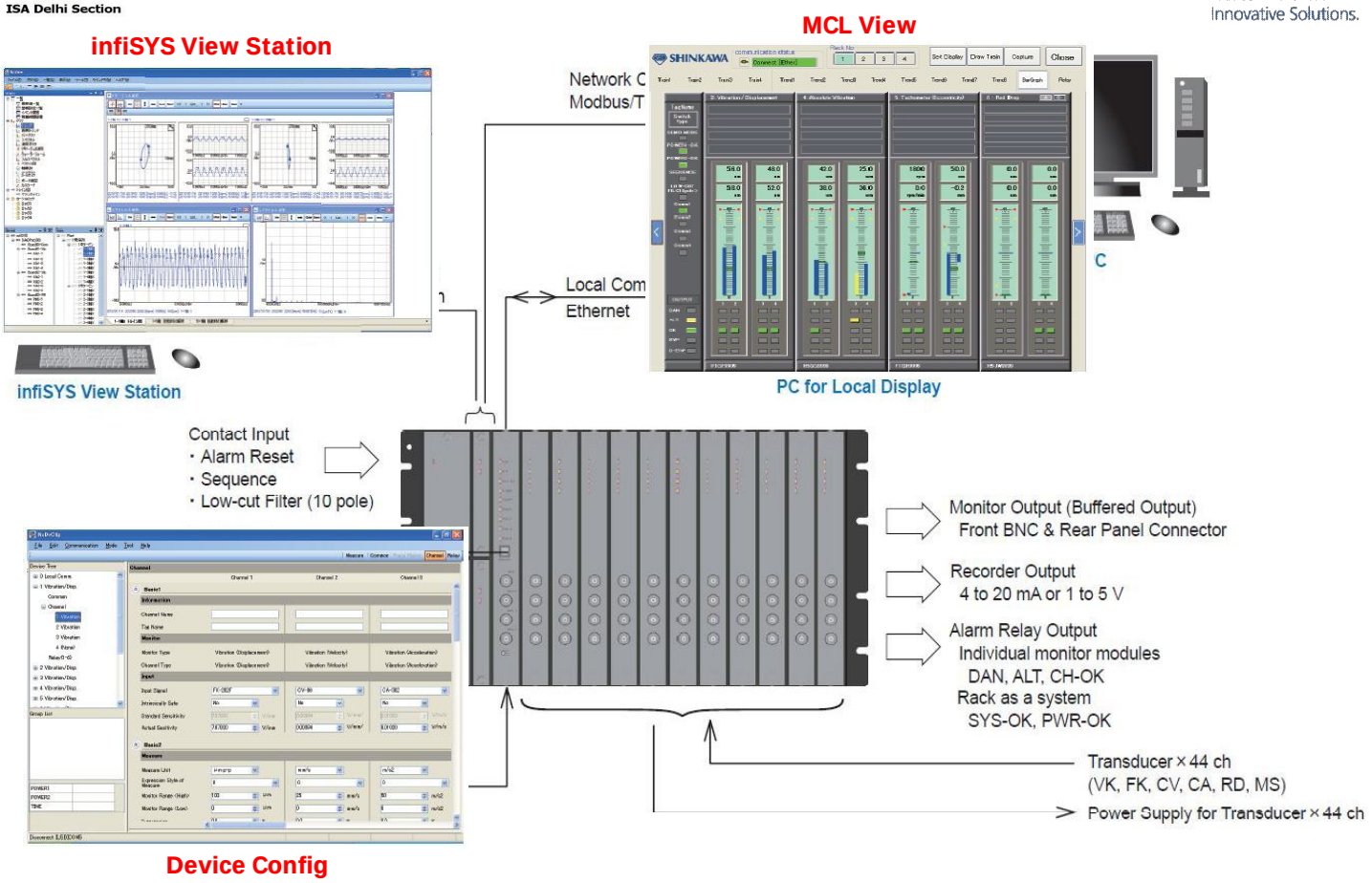

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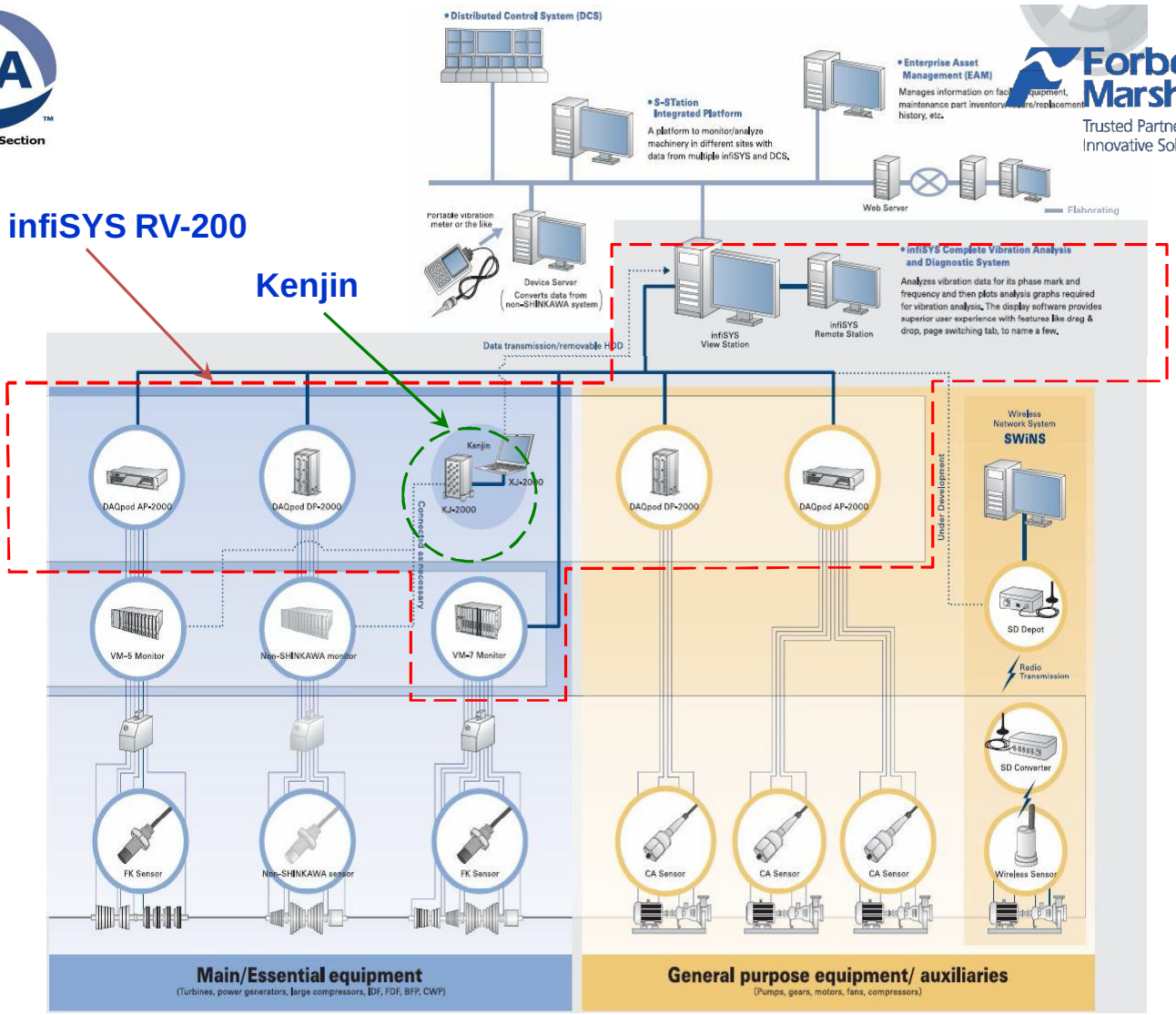


Advanced Analysis Software Functions

- **Fits all rotating machinery**
  Can be used for vibration analysis and diagnostics of all rotating machinery, whether it is small (with rolling element bearings) or large (with journal bearings).

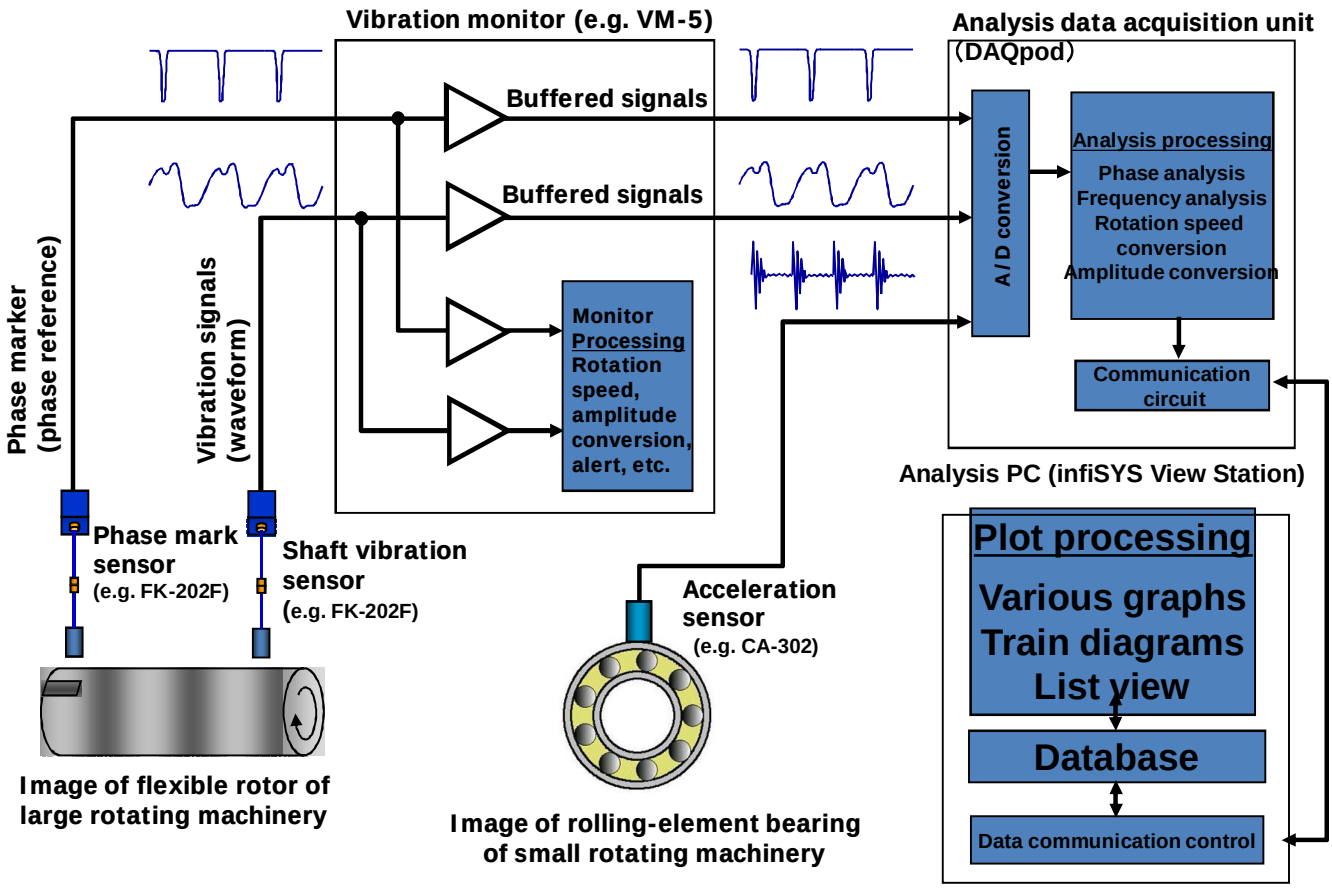
- **High speed data acquisition**
  Shortest acquisition interval: Trend data 1 sec, Waveform data 10 sec

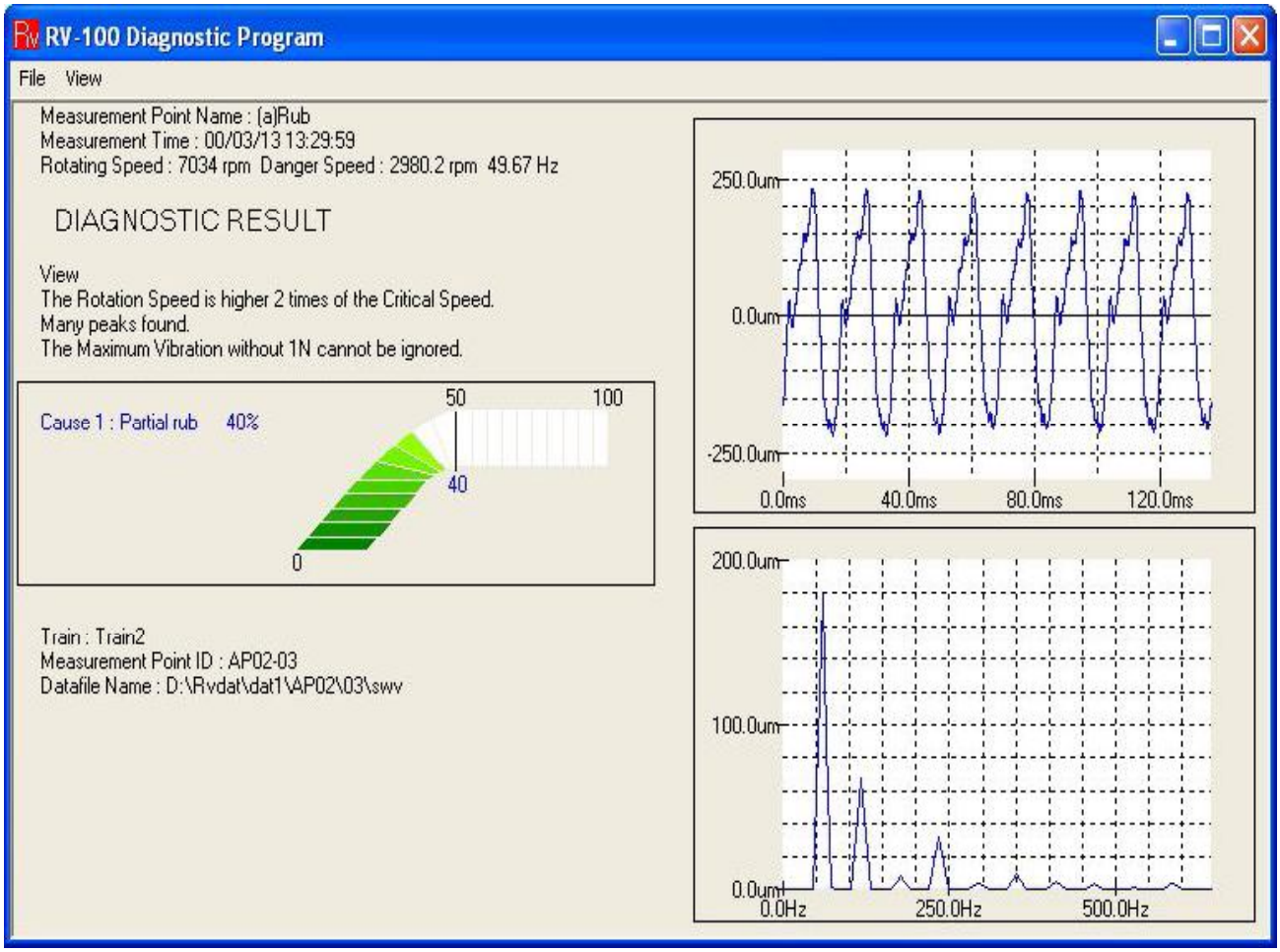
- **Flexible system configuration**
  Configurable with various condition monitors.

- **Sophisticated data analysis with varied graphs**
  The software provides multitude of analysis graphs appropriate for the type of machine or the failure condition to analyze, that satisfy vibration analysts' stringent demands.

- **User friendly UI and plotting functions**
  The display software provides superior user experience with features like drag & drop, page switching tab, to name a few.

How signals are processed
in the Vibration Analysis and Diagnostic System




RV-100 Diagnostic Program
File View
Measurement Point Name : (a)Rub
Measurement Time : 00/03/13 13:29:59
Rotating Speed : 7034 rpm Danger Speed : 2980.2 rpm 49.67 Hz
DIAGNOSTIC RESULT
View
The Rotation Speed is higher 2 times of the Critical Speed.
Many peaks found.
The Maximum Vibration without 1N cannot be ignored.
Cause 1 : Partial rub 40%
50
100
40
0
Train : Train2
Measurement Point ID : AP02-03
Datafile Name : D:\Rvdat\dat1\AP02\03\swv
250.0um
0.0um
-250.0um
0.0ms
40.0ms
80.0ms
120.0ms
200.0um
100.0um
0.0um
0.0Hz
250.0Hz
500.0Hz

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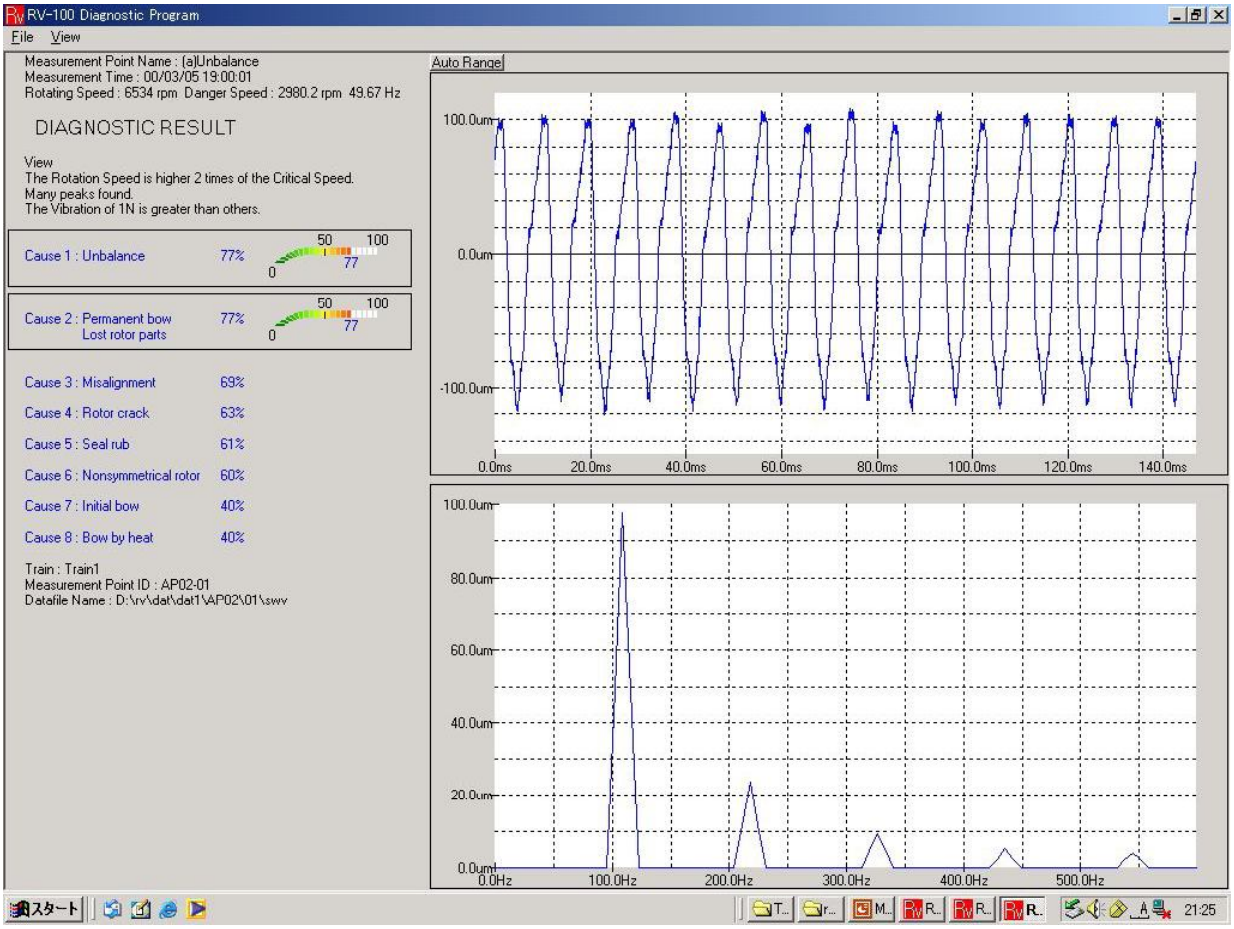

Case Study – Remote Vibration Monitoring

Advantages over Vibration Monitoring System

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VIBRATION SEVERITY PER ISO 10816

Machine	Class I	Class II	Class III	Class IV
in/s		Vibration Monitoring		soft ation
0.01 0.28				
0.02 0.45				
0.03 0.71		good		
0.04 1.12				
0.07 1.80				
0.11 2.80		satisfactory		
0.18 4.50				
0.28 7.10		unsatisfactory		
0.44 11.2				
0.70 18.0				
0.71 28.0		unacceptable		
1.10 45.0				

Vibration Velocity Vrms

Vibration Monitoring will tell about vibration Severity Level

Analysis will tell about WHY vibration severity is so High!

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Remote Vibration Monitoring
Case Study – Reliance Rosa – 4 X 300 MW

- Reliance Rosa Power Plant is having capacity of 4X300 MW as Phase 1 & Phase 2.

- This units are supplied by Shanghai Electric Company Limited with On Line TSI , VMS for ID/FD/PA Fans , CWP/CEP/BFP Fans & Mill Motors along with CHP too. This system is having system as per API 670.

- Reliance Decided to have centralized Vibration Analysis & Diagnosis Center at Mumbai to guide plants by expert team.

- They have decided to have Uniform Single Software for all current plants & future upcoming plants.

Remote Vibration Monitoring
Case Study – Reliance Rosa – 4 X 300 MW

- Rosa Plant was surveyed in detail by Forbes Marshall Expert team and also considered future upcoming plants and expected systems too.

- Forbes Marshall gave Demo Systems at site and proved working the system to Reliance Team.

- Reliance Team agreed on system capability and decided to deploy the system in plant and future plants to have Single Integrated system for all power plants on one plat form to guide the plant team.

RVMS Benefits

- RVMS System purely designed by Forbes Marshall in India and it is proven. Cost Effective Solution !!
- It is possible to integrate any make and model on line TSI / VMS or other systems.
- Less Hardware and simple system.
- It is based on latest software…possible to see anywhere globally by Internet by Laptop or by Smart Phones….
- Benefits – Expert available 24X7 , Reduce Shutdown , Reduce cost of travels and emergencies of experts from Globally….Experts will come prepared before he come at site….