ISA 100 WIRELESS COMPLIANCE INSTITUTE

“SKF Multilog WVT” Condition Monitoring System

The Presentation will start at 11:04 AM EDT. (GMT – 4:04)
Connect to the voice portion of the presentation
using the following Dial in Number: +1 832 551 5100. PIN: 100717#
VoIP and international numbers are not available at this time.

ISA WIRELESS COMPLIANCE INSTITUTE

Andre Ristaino, ISA100 WCI Managing Director

www.isa100wci.org

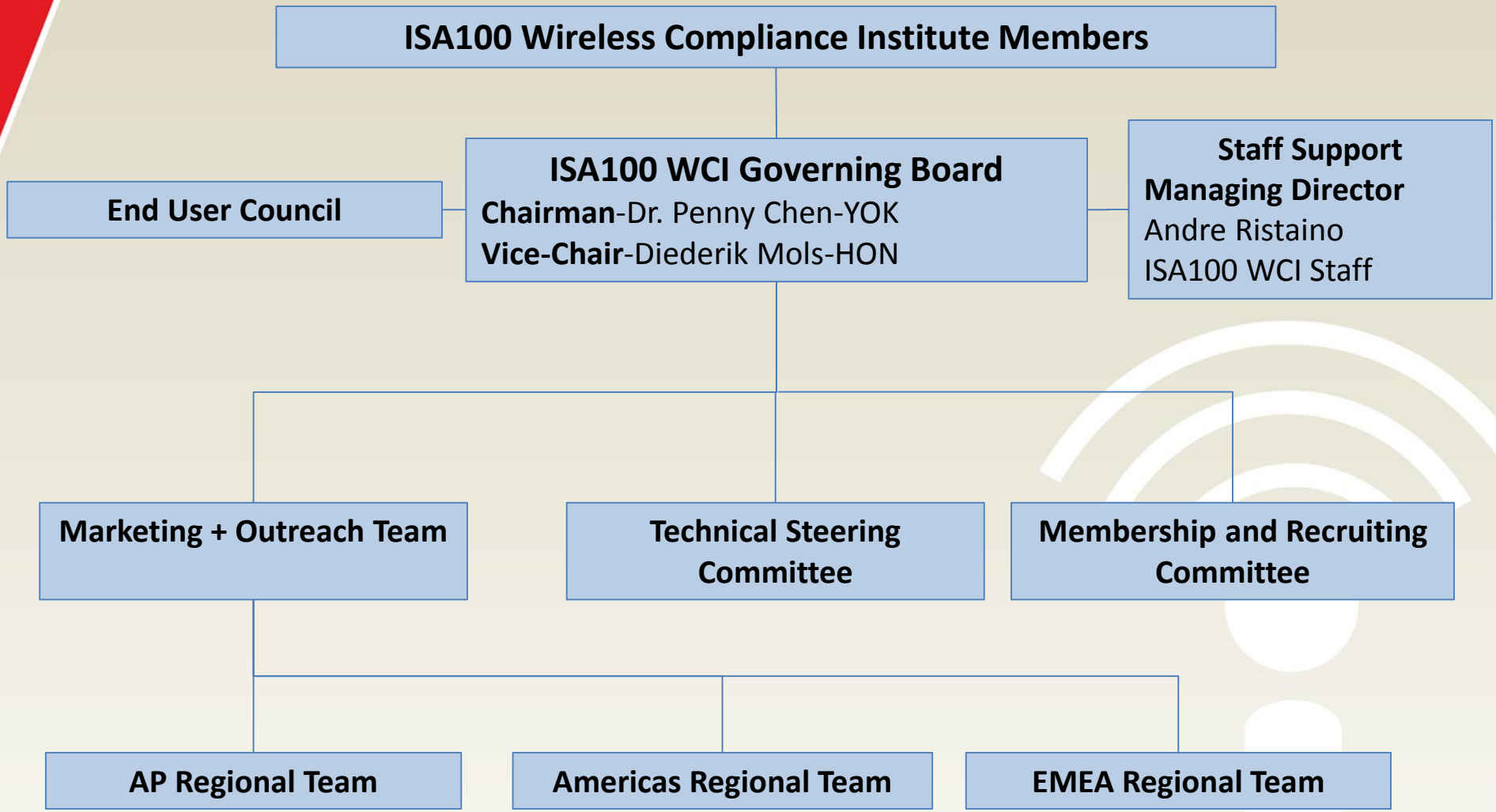
23 September 2015

ISA100 Wireless Compliance Institute Mission

- Manage the ISA100 Wireless certification program to assure interoperability
- Promote the ISA100 Wireless Standard
  - Technology Demo in FCL at Achema June 2015
  - Three live networks with 36 devices from 17 vendors
  - Showcased expanding technical and infrastructure ecosystem
  - Visit the www.isa100wci.org website for more show details

Visit the ISA100 WCI website www.isa100wci.org

Organization Structure



New ISA100 Wireless Devices Added in 2015

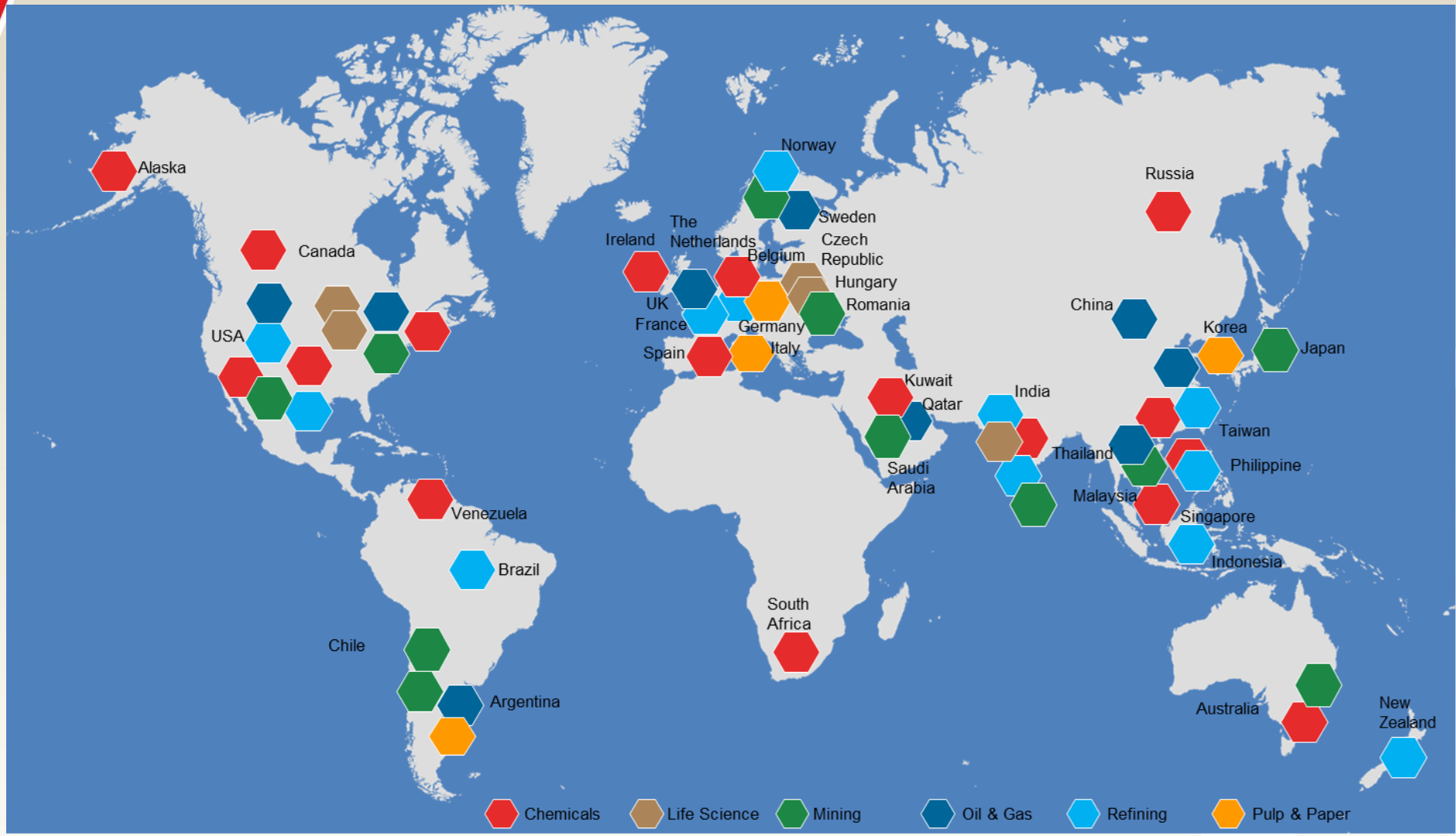
	Device Type / Manufacturer	Certified	Notes
1	Yokogawa Stack / Universal Communication Module	Yes	
2	Yokogawa Multi-protocol I/O module–Hart or Modbus	Yes	
3	Yokogawa Multi-function I/O module– for any sensor	Yes	
4	TLV Steam Trap	Yes	
5	TLV Steam Trap	Yes	
6	Armstrong Steam Trap	Yes	
7	Spirax-Sarco Steam Trap	Yes	
8	Cosasco Corrosion Sensor	Yes	
9	Scott Safety Gas Detector		Q3 Certification
10	Flowserve Valve Positioner		Q3 Certification
11	SKF Vibration Sensor	Yes	
12	CDS Vibration Sensor		Q4 Certification
13	Murata Comm. Module		Q4 Certification
14	Bitherm Steam Trap Monitor		Q4 Certification
15	Nexcom ISA100 to WIFI bridge		Q4 Certification
	More to be announced		

Total ISA100 Wireless device portfolio = 44
Total Certified ISA1000 Wireless Devices = 25

See entire list of field devices and infrastructure products at:
http://www.isa100wci.org/en-US/End-User-Resources/Product-Portfolio

ISA100 Wireless Global Installation Map

Over One Billion Operation Hours



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“SKF Multilog WVT” Condition Monitoring System

Presented by: Frank Mignano

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SKF Multilog Wireless Vibration Transmitter (WVT) - Agenda

- Background on Condition Monitoring
- Why ISA100 Wireless™?
- Product Positioning & Overview
- Value Proposition and real life examples
- Typical installation and Recap
- Questions

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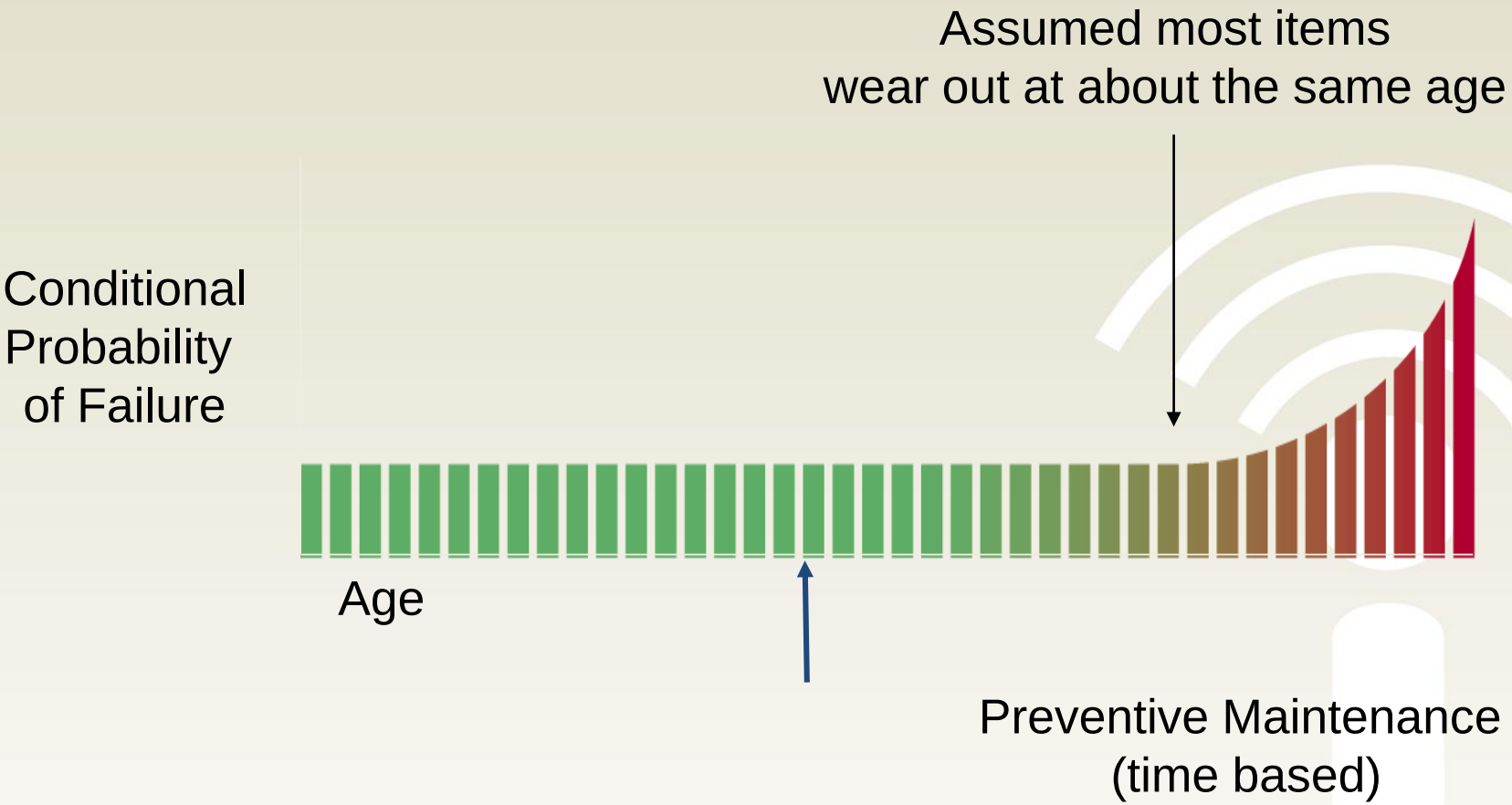
1 Condition Monitoring

Why implement Condition Monitoring?

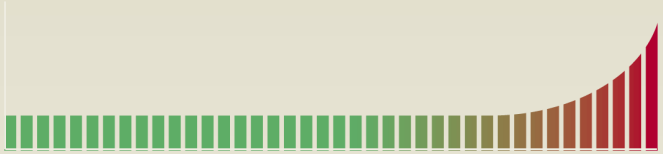
The original definition of failure



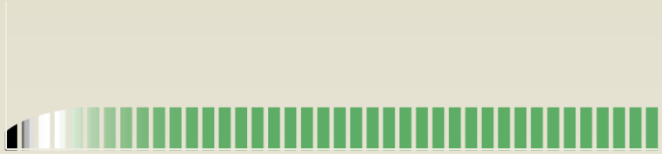
The science of failure – 6 typical patterns

~ 20% time related

~ 80% random



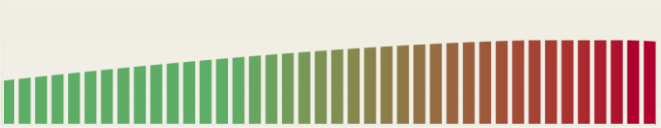
Age Related



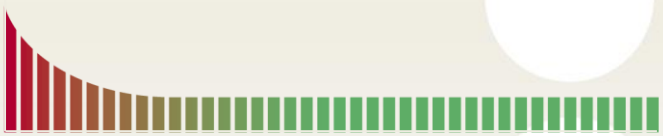
Initial break-in period

Bathtub

Random Failure



Fatigue Related



Infant Mortality

The majority of failures are random, not time-based. (Nowlan and Heap, EPRI, others)

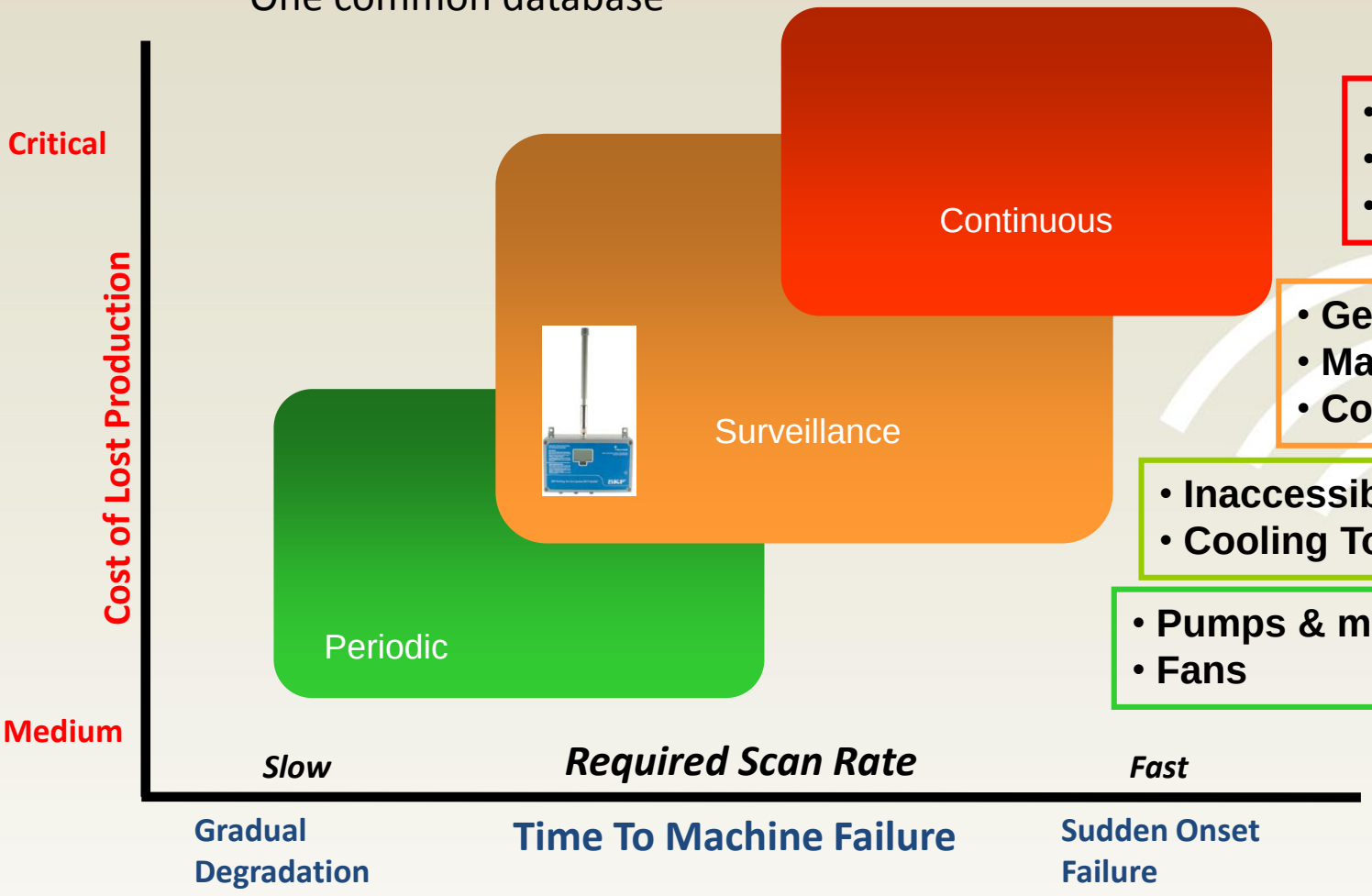
Condition Monitoring Technologies

The Five Main Components to Condition Monitoring are:

- Vibration Analysis
  - Looking at the mechanical integrity of the machine
- Lubrication
  - Looking at proper friction reduction to minimize component wear
- Infrared Thermography
  - Looking at the heat or electrical integrity of the machine
- Ultrasound
  - Looking at air and steam leaks to minimize energy consumption at the plant
- Dynamic Motor Testing
  - Looking at the electrical integrity of motors and power

Predictive Technology Deployment

One common database



Examples:

- **Turbines**
- **Compressors**
- **Generators**

- **Gearboxes**
- **Machine Tools**
- **Conveyors**

- **Inaccessible Locations**
- **Cooling Tower Fans**

- **Pumps & motors**
- **Fans**

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2 Why ISA100 Wireless™?

Differentiators for ISA100 Wireless™ technology

- **Backbone architecture - the right design**
- **Flexibility – in the design**
- **Redundant path creation – Duo casting – unique to ISA100 Wireless™, redundant sigs**
- Ensures reliable and secure data transmission
- Time and cost savings for installation and validation (OTAP)
- Scalable to support thousands of devices
- Power Usage - instruments w/precise Tx/Rx timeslots, adjustable radio power

Cost, risk and time reduction **in the selection and deployment of wireless products and systems.**

3 Product Positioning & Overview

Honeywell

SKF

Alliance

Honeywell Process Solutions, a global provider of leading-edge automation, control and advanced solutions

and

SKF, a global leader in innovative vibration-based machinery monitoring systems, have established an Alliance to provide high value integrated Machinery Protection and Condition-Based Maintenance solutions to our customers.

SKF Multilog WVT - Positioning

SKF has designed a wireless vibration and temperature monitoring system for Semi-Critical & Balance of Plant assets

- That have rolling element bearings (employs SKF's Acceleration Enveloping gE technology)
- where reliability is critical to the safety and production goals of the plant
- and where the cost of repair and loss of production resulting from unscheduled downtime can be dramatically reduced by employing PdM technologies

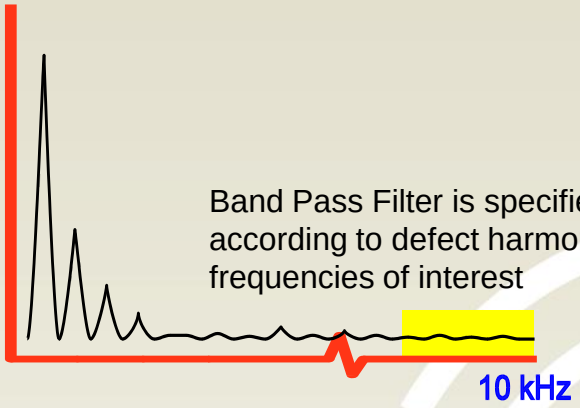
The SKF Multilog WVT is designed for **one machine train**, with 2 sensors on the driver/motor and 2 on the driven machine (i.e. pump, fan)

This system has been engineered to drop into a Honeywell One Wireless (R220.1.67) release up thru the current R230 platform

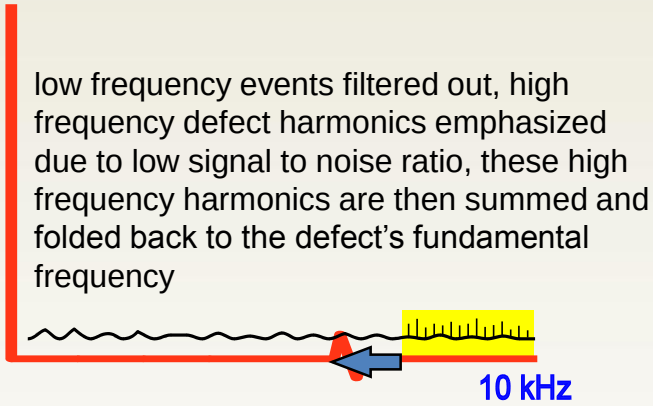
Acceleration enveloping (gE)

1 - Typical Velocity Spectrum

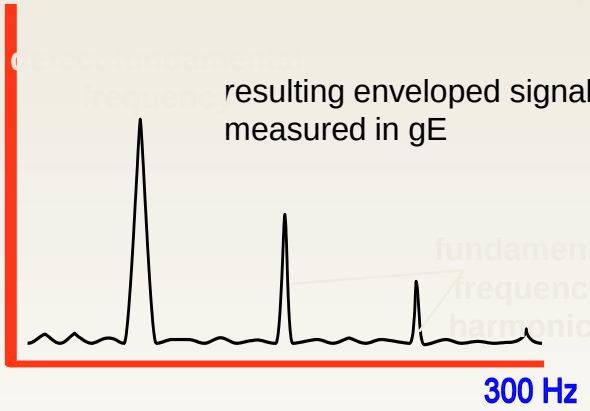
2 - Acceleration Enveloping Process



3 - Acceleration Enveloping Process

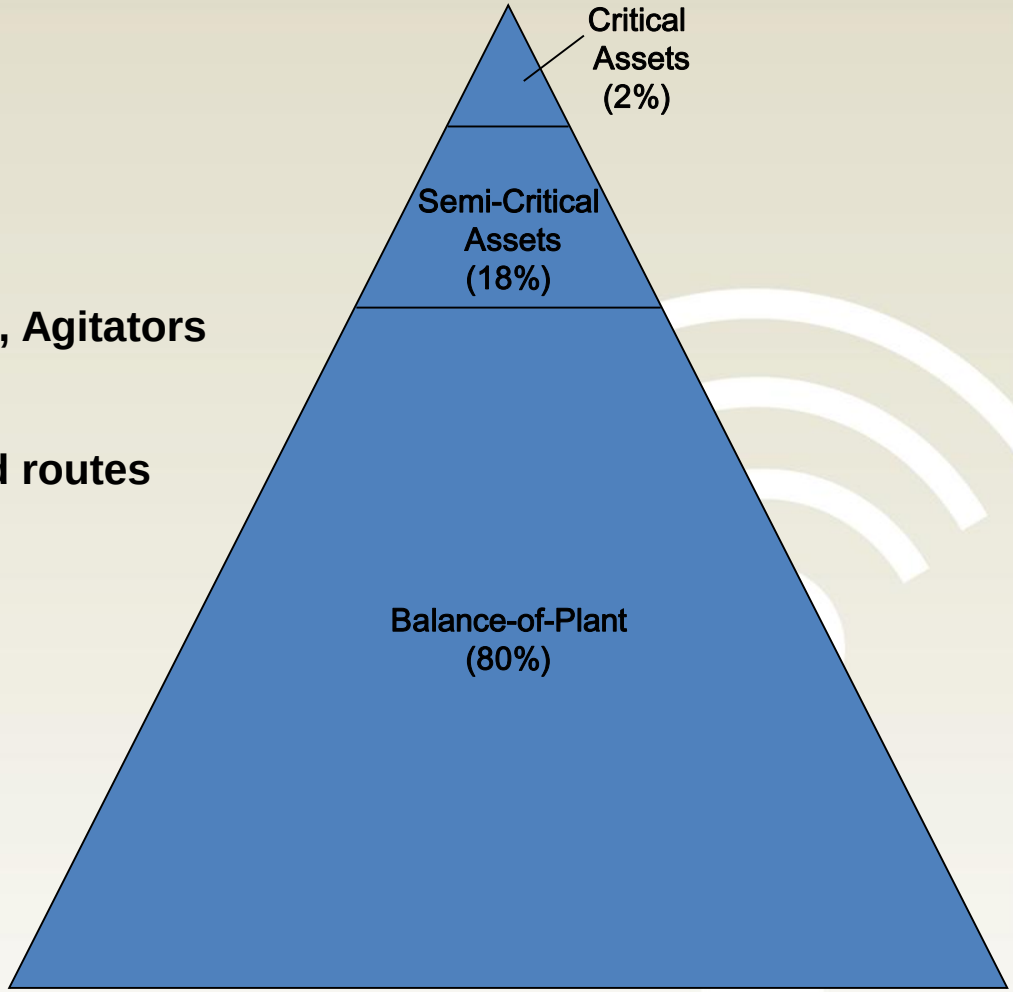


4 - Acceleration Enveloped Spectrum



Target Applications

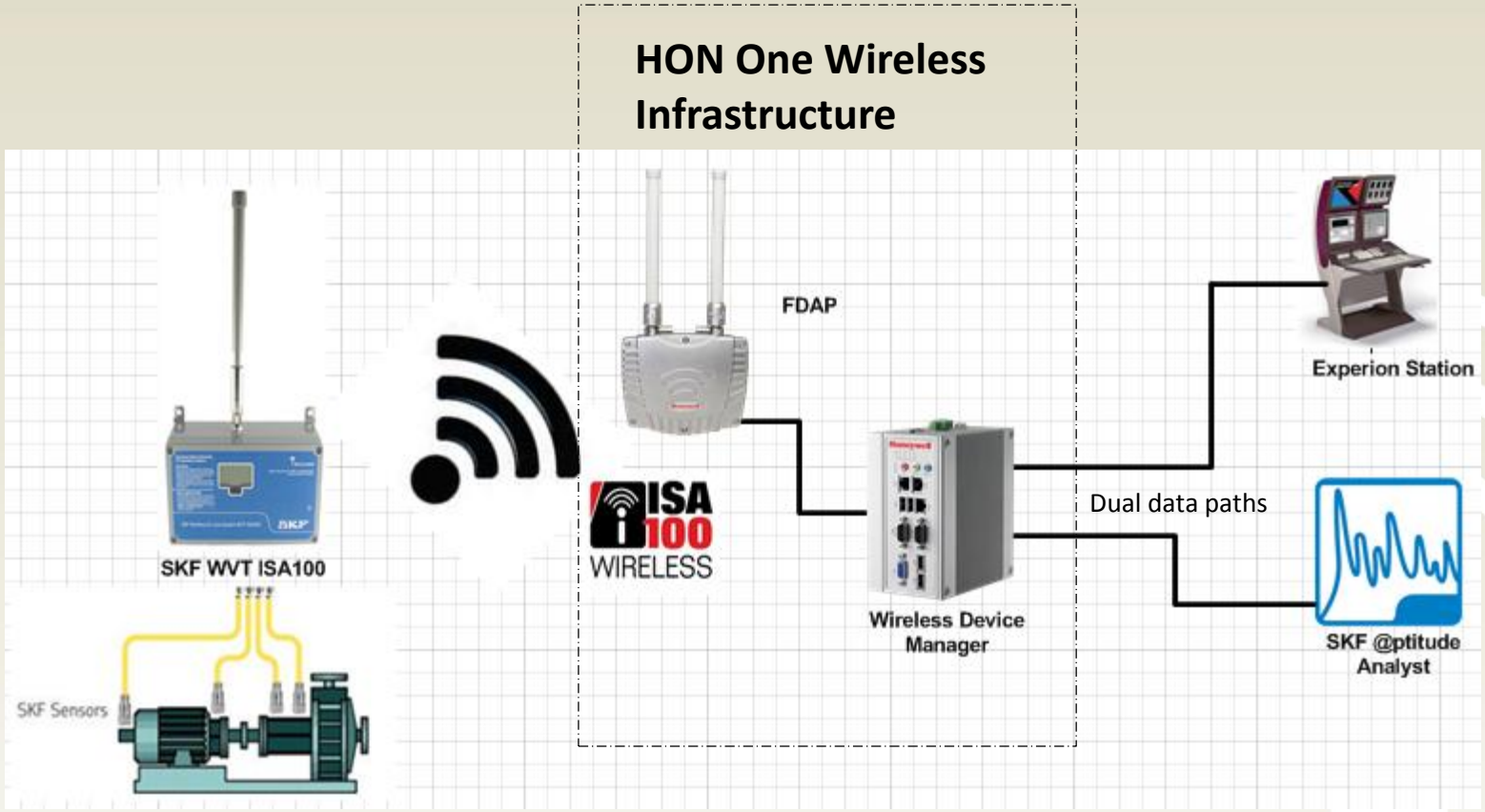
- **Critical Assets**
  - Turbo-machinery (> 1MW)
  - Heavily instrumented
  - API-670 systems
- **Semi-Critical Assets**
  - **Pumps, Fans, Compressors, Agitators (500 – 1000 kW)**
  - **Basic or no instrumentation**
  - **Transmitters or walk-around routes**
- **Balance of Plant (BOP)**
  - **Fixed speed pumps, fans**
  - **No instrumentation**
  - **Walk-around routes**



SKF Multilog WVT - Capabilities

What it is	
An 8 channel Condition monitoring device, plus speed	
Battery or line powered (10-30 Vdc)	
Designed for rolling element bearing, semi-critical & balance of plant machinery	
Developed with 4 specially designed dual purpose, low power transducers – yielding long battery life	
An engineered, drop in addition to Honeywell One Wireless ISA100 Wireless™ networks	
Class 1 Division 2 rated by CSA	
Good for low and high frequency monitoring (0.5 HZ to 15 kHZ)	

SKF Multilog WVT - The Integrated Solution



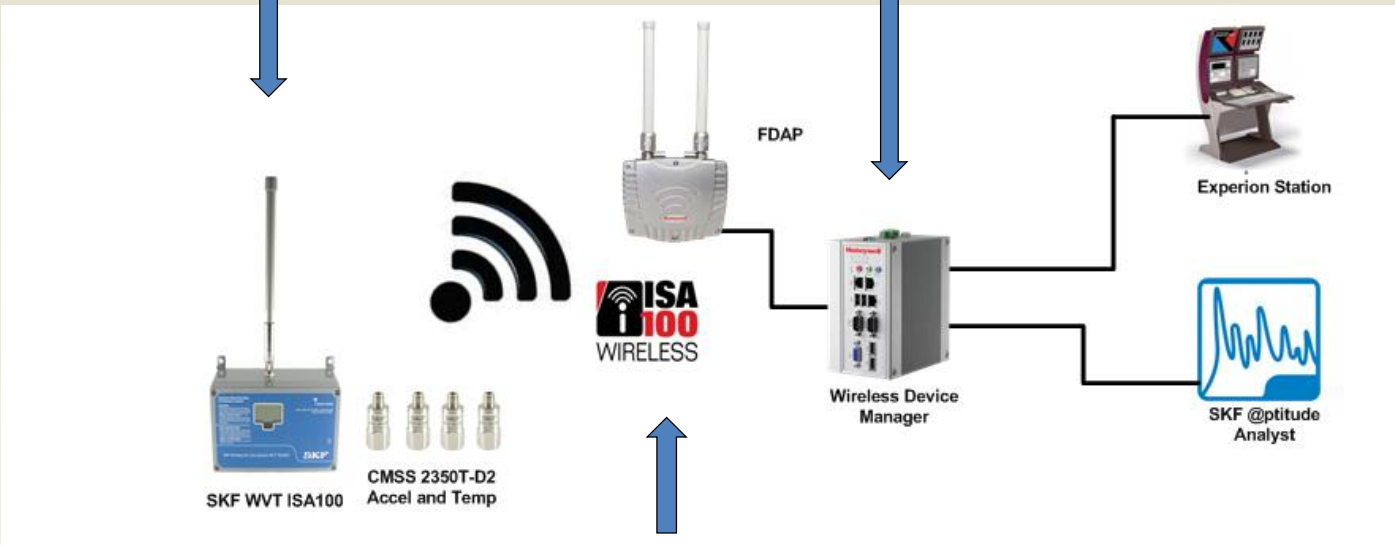
SKF Multilog WVT Condition Monitoring System

SKF Multilog WVT

- Range in field can be up to 300 m (~900 ft), line of sight
- Direct communications to FDAP preferred, but mesh possible

- **WDM (Wireless Device Manager)**
  - HON product, Powered (+24VDC)
  - Manages the ISA100 Wireless™ field device network, Security Mgr
  - Allows users to design, commission, configure, and monitor the wireless field network and devices connected to it from a centralized location. Connects to the wired network via Ethernet

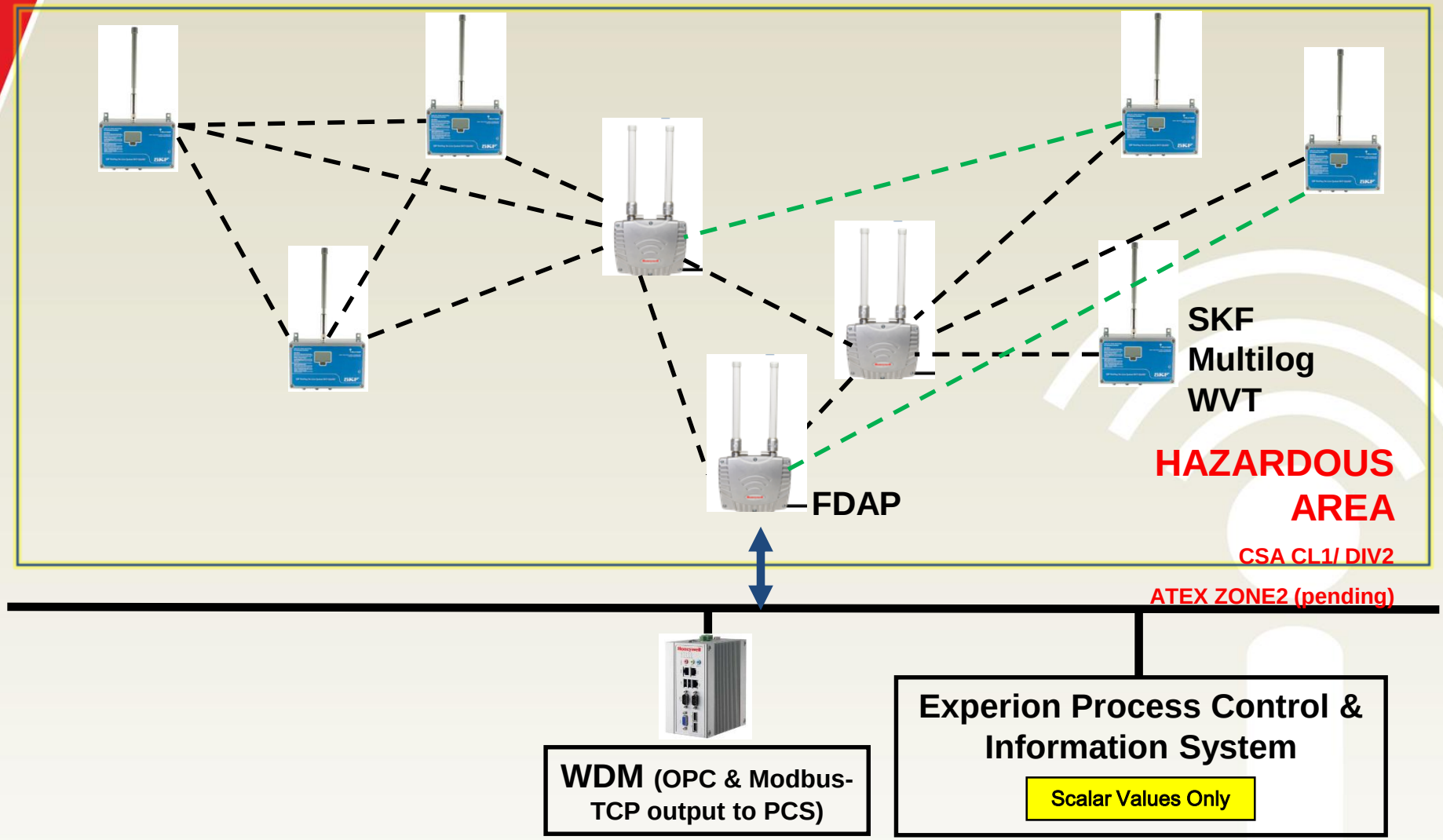
.



FDAP (Field Device Access Point)

- HON product, Powered (+24VDC/ 110VAC)
- Mesh Routing node (Router) –OR- Access point
- Saves SKF Multilog WVT battery life when used as mesh routing node

Scalar variables to Process Control Systems (PCS)



Analysis Data to the Predictive Maintenance Group

FDAP

DataController Software

SKF XML

SKF @Analyst

Scalar Values + Dynamic (FFT) Data

WDM

(OPC & Modbus TCP)

HART
OPC
MODBUS

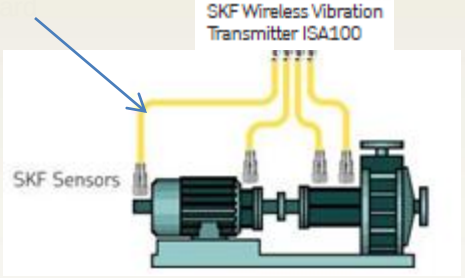
Process Control & Information System

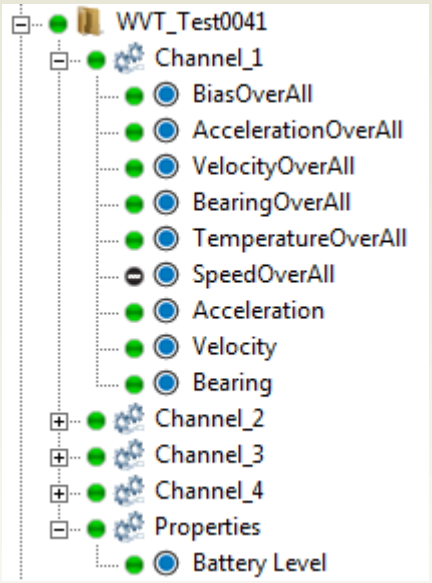
Scalar Values Only

PARALLEL PATHS

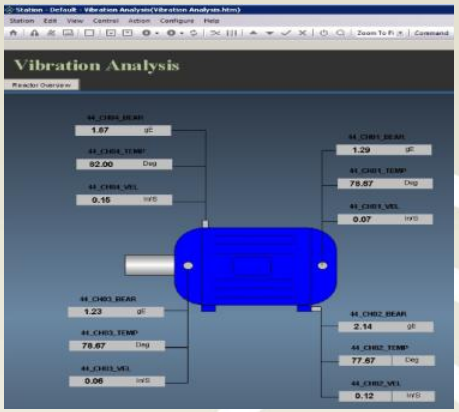
SKF Multilog WVT infrastructure – How it works

Auto Hierarchy creation



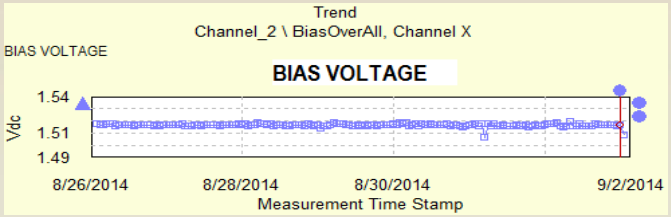


Experion (or any) DCS - Graphics display

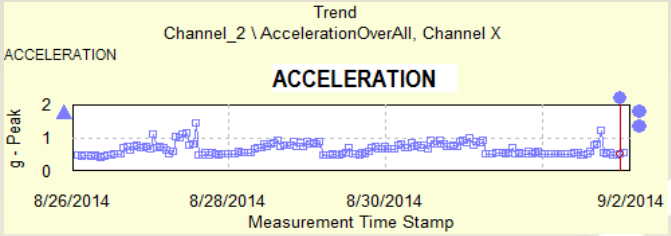


5 PV values to the DCS – per sensor!

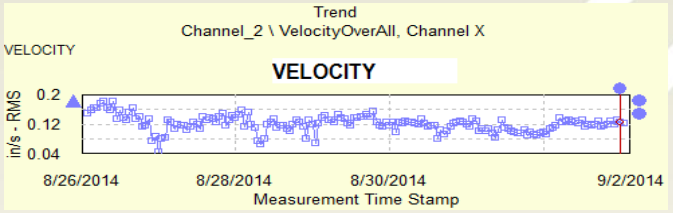
Up to 5 parameters per sensor –
(1 week trend plot, 168 points)



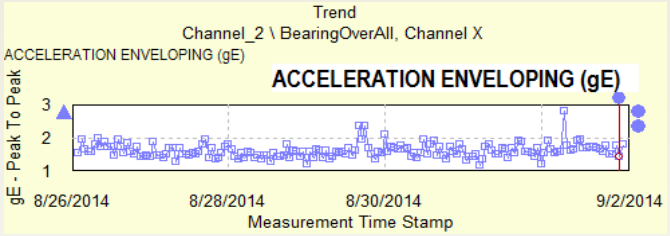
Sensor/cable OK?



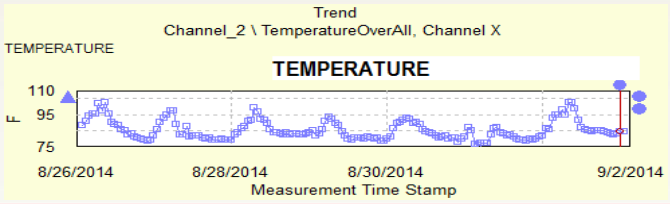
Measures force (g)



Case vibration (in/s)



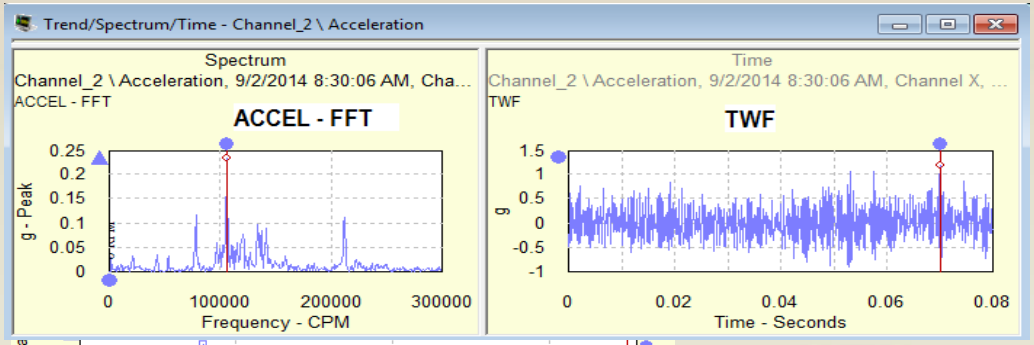
Bearings, gears, lube

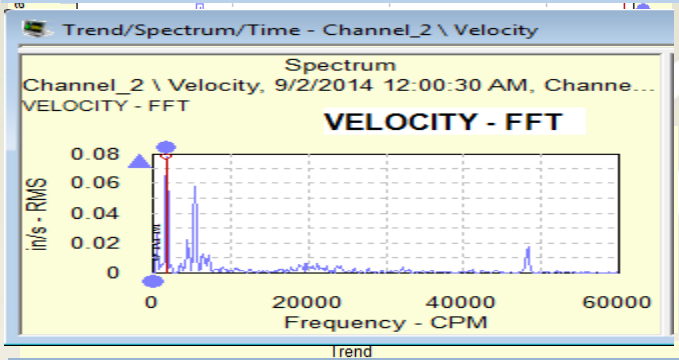


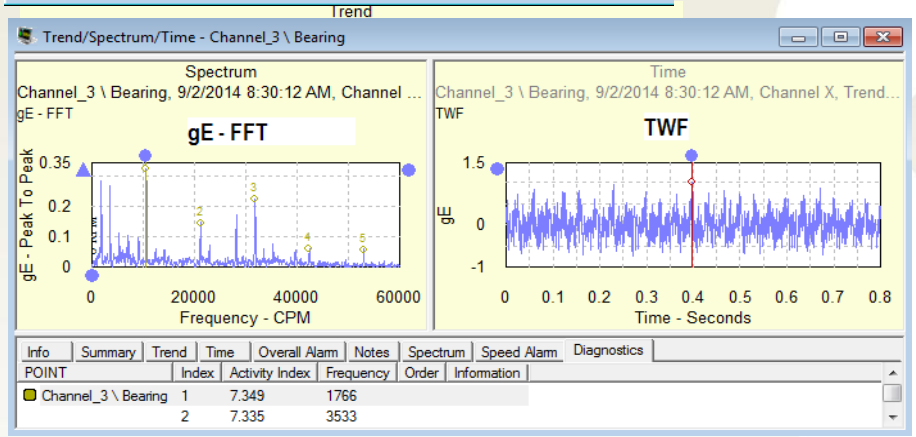
Surface Temp

5 PV values PLUS advanced analysis data to @ptitude Analyst

Analysis plots per each vibration measurement – Accel, Vel & gE



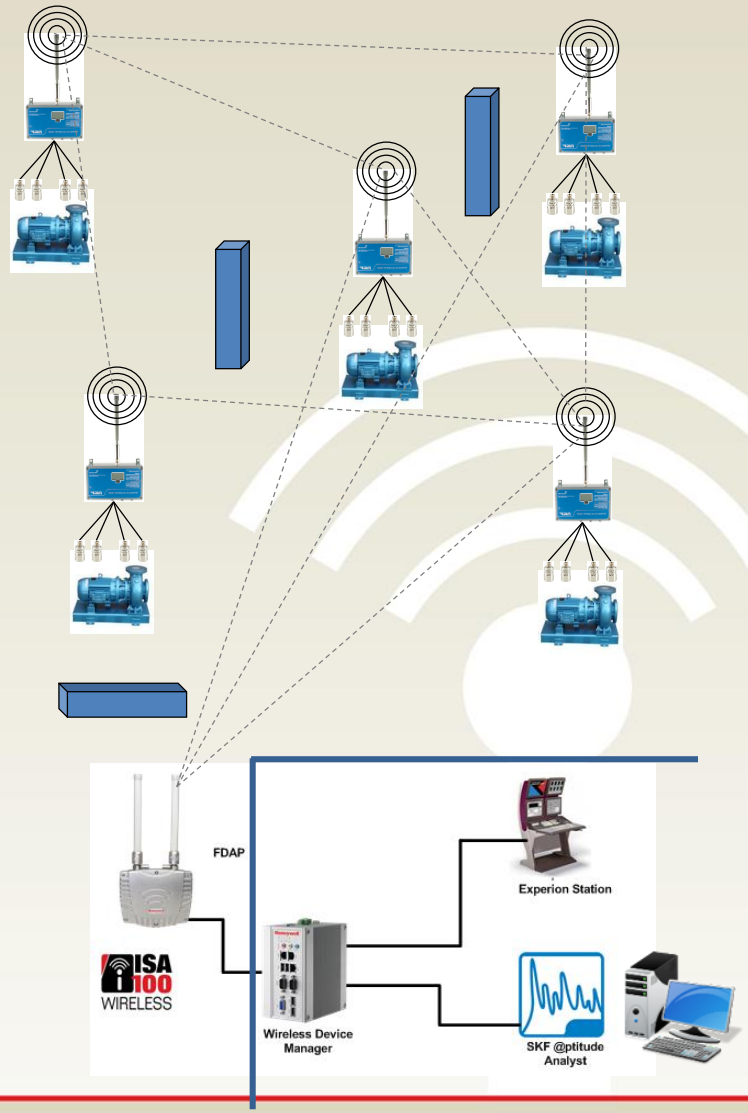




4 Value Proposition

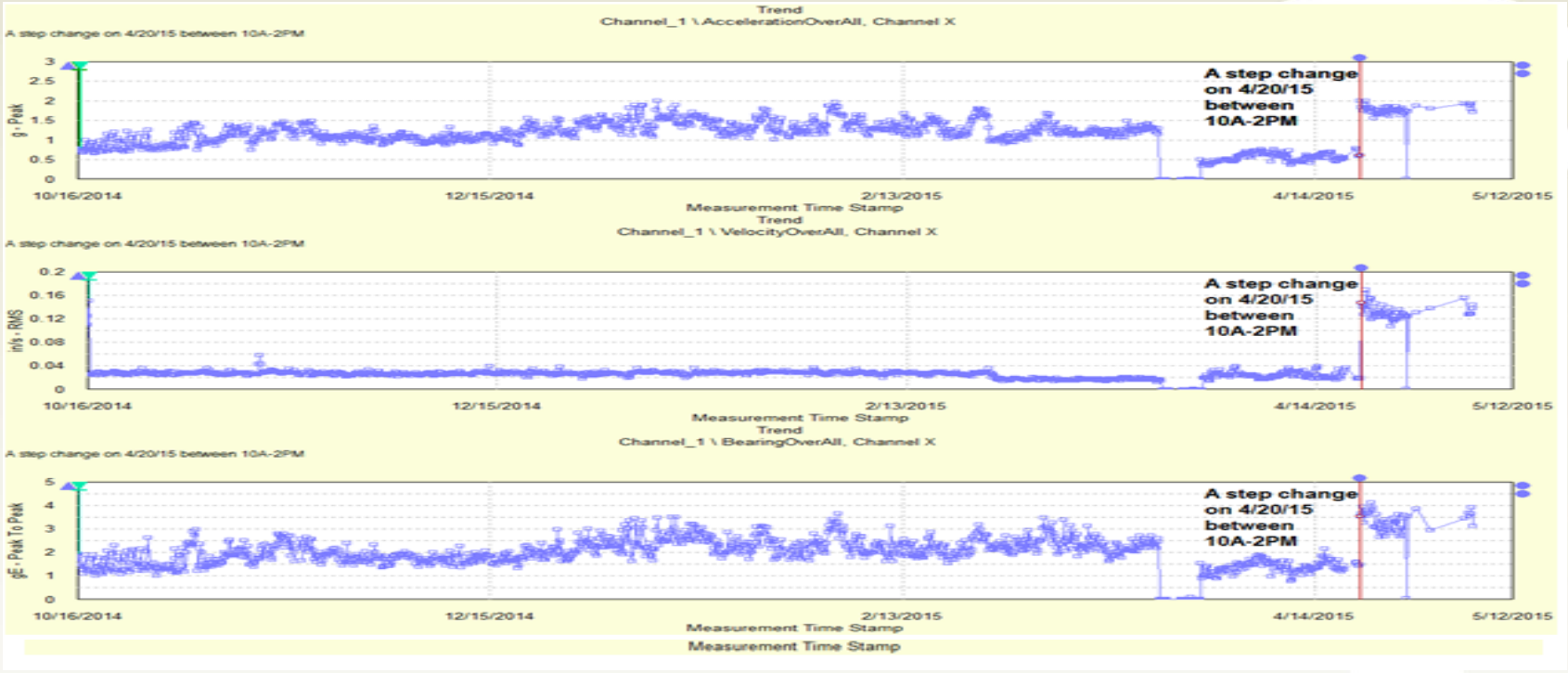
Benefits of wireless in Condition Monitoring

- **Automatic and repeatable** collected data not adequately covered by existing portable walk-around routes
  - Insufficient manpower to collect data
  - Insufficient frequency of data collection
- **Reduced cost/time to Implement**
  - Wireless points can be a factor of **8** less costly to install than an equivalent ‘wired’ point
    - Avoid cable trays and wiring
    - Reduced installation **time**
    - Reduced project engineering
- Easy deployment as a temporary tool
  - Track suspect problems flagged by walk-around
  - Monitor remote locations without having to go to site
- Where Wired systems cannot go
  - Moving machines
  - Locations inaccessible by hand or wire



Added value over walk-around data collection

- By collecting data automatically, personnel can focus on analysis and RCM activities rather than collection of data.
- By providing measurements much more frequently than is practical by walk-around data collection, customers can gain timely insight into machine behavior / condition and can more effectively avoid unplanned downtime.



Cost savings versus cabled instrumentation

- Total cost of ownership of a wireless monitoring system can be several times lower than a wired system.
- This is due to the higher installation cost of a wired system, which depends on:
  - Cost of labor
  - Difficulty and distance of required cable installation
  - Hazardous area or not
- Installation cost savings also come in form of time saving:
  - Reduced Field/Area Engineering cost: no need for engineering and documentation of cable support system
  - Reduced System Engineering cost: no need for planning and documentation of cable routing
  - **Ongoing cable maintenance, grounding issues**

Example of cost avoidance potential

1 - Minimize Repair cost (i.e. Pump);

- Repair cost $6,000 to $14,000 — $ 10,000
  - (Bearings cost < $400)

2 - Lost production $5,000 per hour (12 hrs) — $ 60,000

3 - Lost opportunity – can not meet delivery — $?

- Customer looks for alternate supplier

4 - Safety — $10,000+

- Leak, OSHA and EPA fines
- Injury

Total avoidable costs — $80,000+

Cable installation costs

Example of cabling cost figures, for 100 ft new cable in 30 ft new cable tray, Labor cost assumed at $140/h:

– Material cost 100 ft cable ~$4.5/ft	$ 450
– Material cost 30 ft field cable tray ~$30/ft	$ 900
– Labor cost of installing cable tray ~0.5 hour/ft	$ 2100
– Labor cost cable pulling ~15 feet/hr, 100 feet	$ 980
– Labor cost cable termination ~1 hour	$ 140

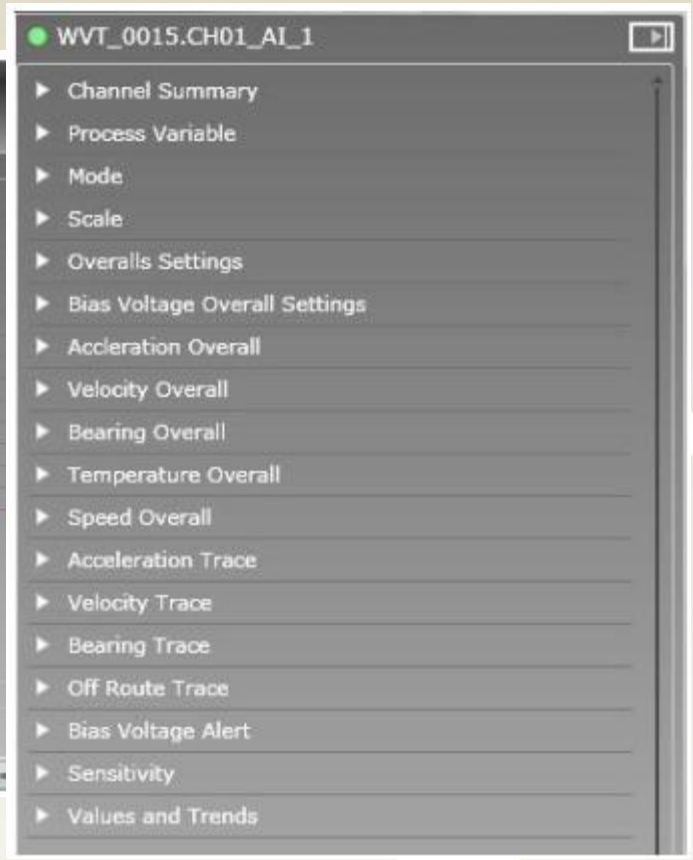
(in this example $45 average per foot)

Cost saving with a Wireless Field Instrument $ 4,570

5 Typical Installation & Recap

CHEMICAL PLANT – (TEMPORARY INSTALL)

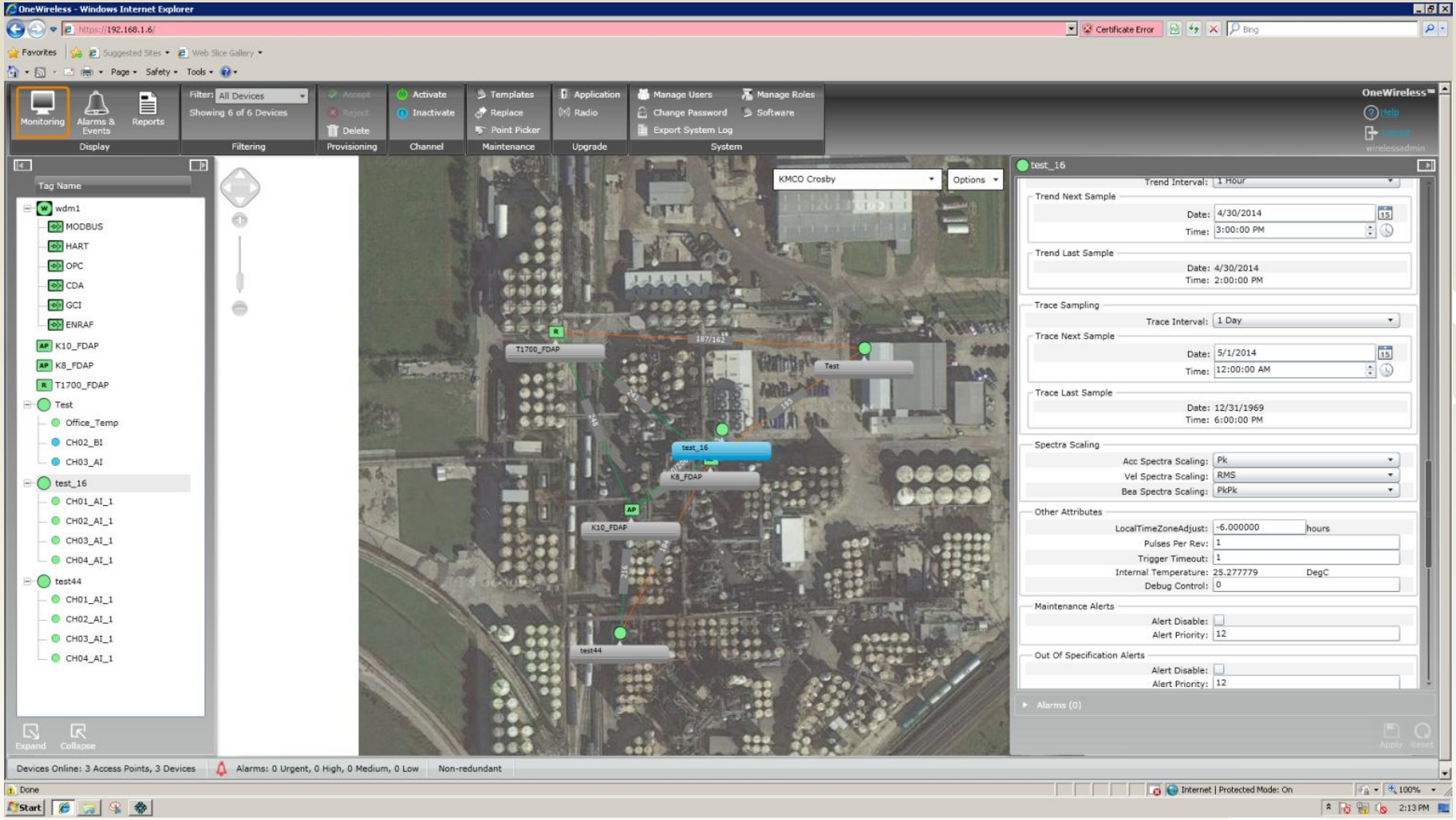
WDM- HON One Wireless network Setup & Management software tool



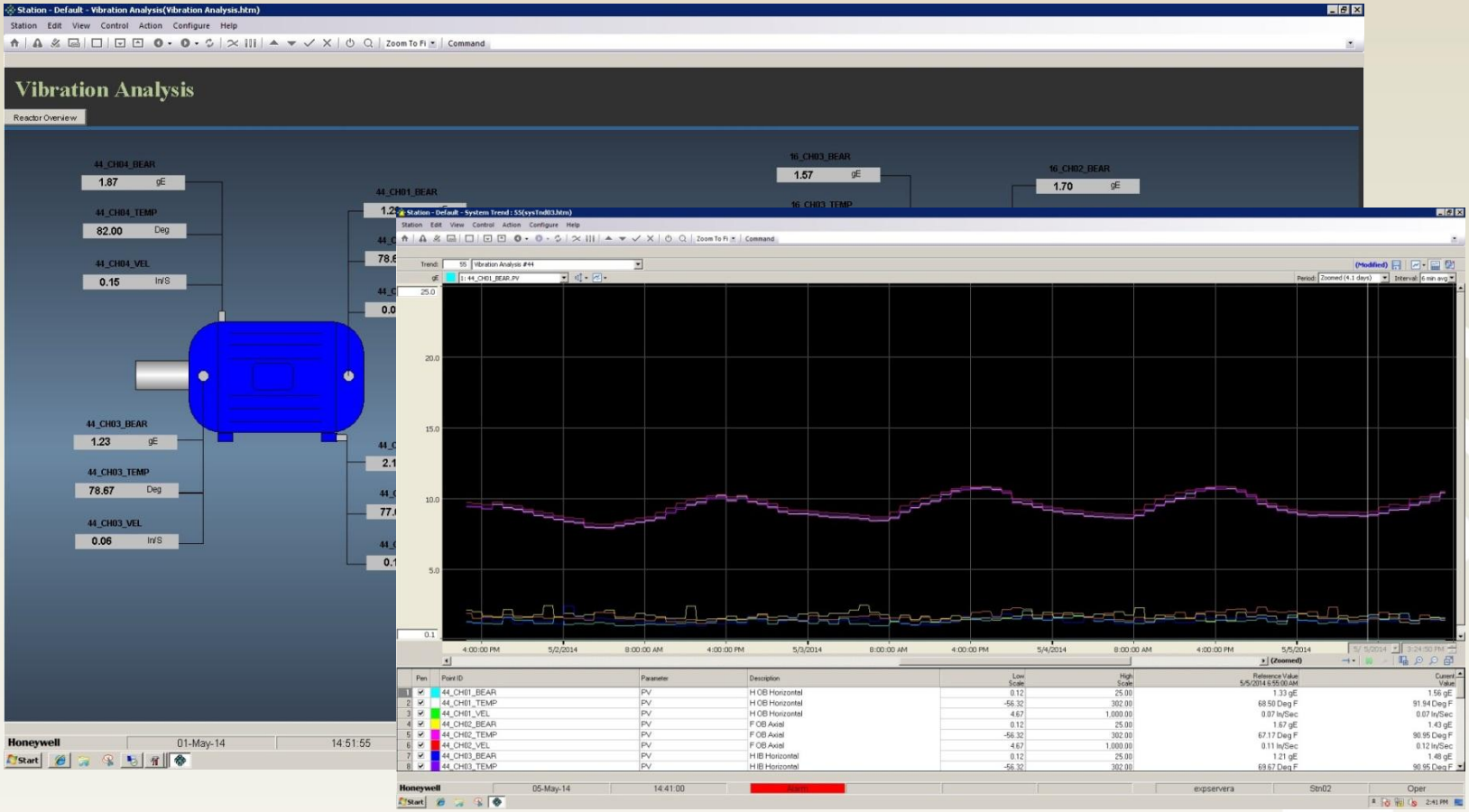
- Property panel on the right contains the configuration properties of all the devices.

CHEMICAL PLANT

Wireless Device Manager (WDM) Software, showing FDAP's and SKF Multilog WVT's



Honeywell Experion Process Knowledge System data displays



- Graphic from HON DCS machinery condition parameter status and trend data

SKF Multilog WVT - Recap

SKF Multilog WVT
ISA100 Wireless™
4 sensor / 8 Channel (plus speed)
Wires from sensors to device Can measure speed Local display
NEC Class 1 Division 2 (ATEX Zone 2 pending)
-40-120°C on bearing Can measure from 0.5 Hz to 15kHz (low & high freq)
Honeywell provide the wireless expertise SKF provide the Vibration expertise
Battery or line power +24Vdc COTS batteries
300m inter-device range

Questions?