



## ISA100 WCI Webinar

Webinar date: 19 May 2021

The presentation will begin at 0800 Pacific Time

# Wireless Vibration: Overview & Applications

Presenters:  **Bently Nevada**  
a Baker Hughes business

**Chris McMillen**

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# Agenda

1. About the speaker
2. Introduction Industrial Wireless and ISA100
3. Bently Nevada Ranger Pro Overview
4. Bently Nevada Ranger Pro Installation & Applications
5. Summary
6. Q&A



# About the speaker



## Chris McMillen

Senior Product Manager - Sensors

Digital Solutions

Bently Nevada, a Baker Hughes business



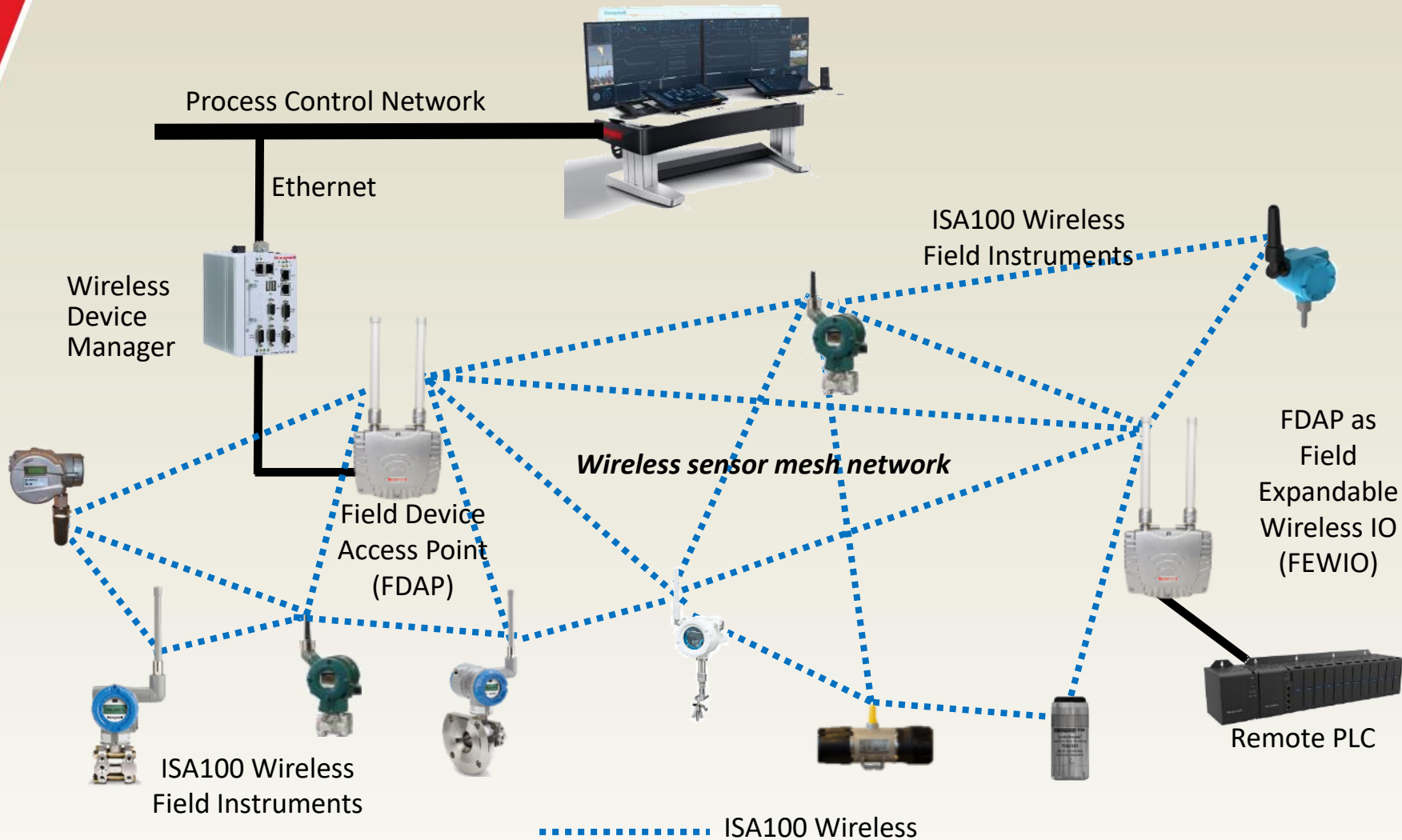
Chris is the Senior Product Line Manager for Bently Nevada sensors. He is responsible for new developments and lifecycle management within the Bently Nevada sensor portfolio for both wired and wireless solutions. His 20+ years with the business have included roles within engineering, project management and leadership, and business acquisitions. Chris is a graduate of Washington State University in Pullman, Washington with a bachelor's degree in Mechanical Engineering.

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# Introduction to Industrial Wireless



## Applications examples

- Machine health monitoring
- Basic process control
- Monitoring of well heads
- Remote process monitoring
- Leak detection monitoring
- Diagnosis of field devices
- Condition monitoring of equipment
- Environmental monitoring
- Tank level monitoring
- Gas detection
- Fuel tank gauging
- Steam trap monitoring
- Open loop control
- Stranded data capture
- And more

# ISA100 Wireless Fast Facts





- International standard IEC 62734 since 2014
- Complies with ETSI EN 300 320 v1.8.1 (LBT)
- End-User Driven Standard - meeting all current and future industrial needs
- Sensor routing or field routers for best performance – Freedom of choice
- Broad Multi-Vendor Portfolio of ISA100 Wireless Devices
- ISA100 Wireless enables SIL-2 Certification
- Ensured Interoperability - best-in-class solutions from best-in-class suppliers
- Readily available ISA100 Wireless Modules and Stacks
- Enable fast-track development and go to market

# Benefits of ISA100 Wireless Instrumentation

Cost Savings	<ul style="list-style-type: none"><li>• Up to 90% of installed costs of conventional measurement technology can be for cable conduit and related construction</li><li>• Typically: 1/2 the costs, 1/5 of the time</li><li>• New and scaled applications are now economically feasible</li></ul>
Improved Reliability	<ul style="list-style-type: none"><li>• Wireless sensors can be deployed in remote/difficult areas</li><li>• Wireless can add redundancy to a wired solution</li></ul>
Improved Visibility	<ul style="list-style-type: none"><li>• Condition monitoring of secondary and remote equipment</li><li>• Process monitoring, fast additional data for trouble shooting</li></ul>

# ISA100 Wireless Product Portfolio

Infrastructure

- 
**Independent Gateway**
  - Honeywell, Yokogawa
- 
**Access Point (AP)**
  - Honeywell, Yokogawa
- 
**Integrated Gateway/AP**
  - Honeywell, Yokogawa, CDS, Nexcom
- 
**GW/AP + Recorder**
  - Yokogawa
- 
**Adapter (HART, etc.)**
  - Honeywell, Yokogawa

Measurement & Control

- 
**Temperature**
  - Honeywell, Yokogawa
- 
**Pressure / Flow**
  - Honeywell, Yokogawa
- 
**Level**
  - Honeywell, Yokogawa
- 
**DI/DO, AI**
  - Honeywell, Yokogawa
- 
**Valve Position**
  - Eltav, Flowserve, Honeywell

HSE + Life cycle

- 
**Corrosion**
  - RCS , Honeywell
- 
**Steam Trap**
  - Spirax Sarco, TLV, Armstrong, Bitherm
- 
**Vibration + Temperature**
  - Bently Nevada
- 
**Gas**
  - GasSecure, Scott Safety, New Cosmos, Riken Keiki
- 
**pH**
  - Honeywell, Yokogawa



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# Bently Nevada

1. **Measure** – vibration, temperature, flow, pressure, process
2. **Monitor** – Protect plus collect sensor data
3. **Connect and Analyze** – aggregate and trend for actionable information

Range of solutions and technology applied as not all assets and processes are equal

Connect & Analyze

Monitor

Measure



# Condition Monitoring & Wireless

*"By having the (RangerPro) wireless platform combined with the portable platform, and the continuous platform will give us the advantage of having one software manage all three. A one stop shop for all vibration readings"*

## Multi-Solutions

### Wired

- ✓ Higher point counts
- ✓ Fastest sampling rates
- ✓ Protection capable
- ✓ More sensor types



### Wireless

- ✓ Simple to deploy
- ✓ Fast to expand
- ✓ Cost effective



### Portables

- ✓ Human element - See, touch, smell
- ✓ Periodic measurements
- ✓ Many assets



	Portable	Wireless	Wired
Data Frequency	Good	<b>Better</b>	Best
Installation & Deployment	Easiest	<b>Easy</b>	More challenging
Sampling Rates	Good	<b>Better</b>	Best
Protection	n/a	<b>n/a</b>	Best
Investment \$			

## Wireless factors

### Range

Distance between sensor and gateway

### Protocol

Proprietary or open

### Data Bandwidth and Frequency

Simple/rich data and how often

### Power Source

Battery life, availability, ease of maintenance

### Security

Encryption methodology

# Ranger Pro

## Wireless Condition Monitoring

- Cost effective for new or expansion ease
- Difficult or hazardous environments
- Compliments existing portables/wired monitoring
- Flexible architecture via mesh topology



**ATEX/IECEX Zone 0/CSA Class 1 Div 1**



**Triaxial vibration + temperature**

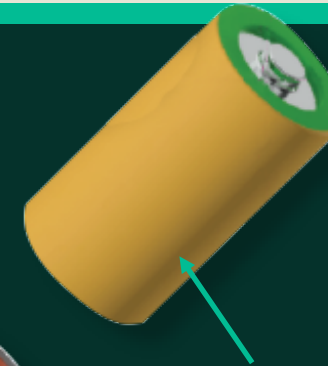
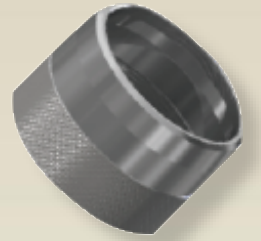


**System 1 Condition Monitoring**



**Wireless ISA100 or WirelessHART®**

Radio E-module



Standard battery size ...  
Bently provided or readily  
available for end user  
procurement

3.5"  
(89 mm)



1.6"  
(41 mm)

# Ranger Pro Solution

## Sensors

- Triaxial vibration + temperature
- Up to 5 yr battery life
- Auto forming ISA100 or WirelessHART®
- ATEX/IECEX Zone 0, CSA Cl1 Div1

## Configuration

All user selectable

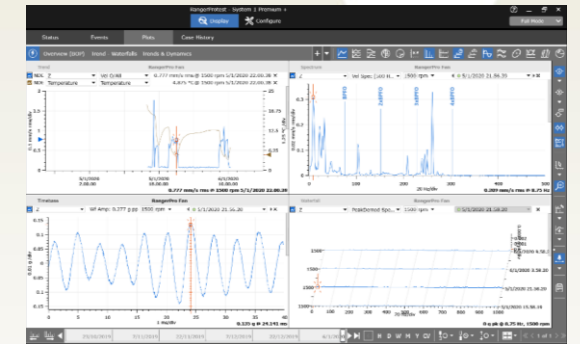
- Accel, Velocity, Peak Demod
- 10 min to 28 day collection interval
- **Advanced features:** Data on demand, severity, & vibration

## Gateways

- Wireless manager/router
- ISA100 via:
  - Honeywell OneWireless®
  - Yokogawa YGFW 410/510
- wHART via:
  - Emerson 1410/1420

## System 1 software

- Machine condition monitoring
- Trended values + waveform/spectrums
- Alerts and alarms
- Machine to plantwide



# Capability detail

All user configurable to Over the Air

## 1. Data acquisition intervals

- Overall accel/velocity + temperature (10 min to 6hrs)
- Spectrum/Waveforms ( 6 hr – 28 days)

## 2. Acceleration (5-10kHz) up to 8192 samples

## 3. Velocity (5 – 2kHz) up to 3200 lines

## 4. Data on Demand: Acquire data now

- Typical response time ~8-10 min
- Cancels previously scheduled data
- 90 min delay on scheduled data

## 5. Data on Vibration: threshold based data acquire

- Below threshold = skip transmission (machine off)
- Above threshold = transmit as configured

## 6. Data on Severity: severity based data acquire

- TA Proven method based
- User defined level 3 and 4 limits

Measurement Trends	! Period
Temperature Process Value	1 h
Vibration Process Values	1 h
Acceleration Waveform	1 d
Velocity Spectrum	1 d
PeakDemod Spectrum	1 d

As configured data acquire interval

Temperature	Setting	Acceleration Waveform	X	Y	Z
Mode	Enabled	Mode	Enabled	Enabled	Enabled
Units	°F	Units	g	g	g
Overall Acceleration	X	Y	Z		
Mode	Enabled	Enabled	Enabled		
Units	g	g	g		
Sub Units	rms	rms	rms		
Fmin	5	5	5		
Fmax	5000	5000	10000		
Overall Velocity	X	Y	Z		
Mode	Enabled	Enabled	Enabled		
Units	mm/s	mm/s	mm/s		
Sub Units	rms	rms	rms		
Fmin	5	5	5		
Fmax	1000	1000	2000		
Overall PeakDemod	Z				
Mode	Enabled				
Units					
Demod Band Min					2000
Fmax					1000
Lines					1600

Data On Demand	Control
Status / Mode	Acquire
Data On Vibration	Value
Status / Mode	Enabled
Threshold / Axis	XYZ
Data On Severity	Value
Status / Mode	Enabled
Level 3 / Axis	XYZ
Level 4	8.1280 mm/s rms

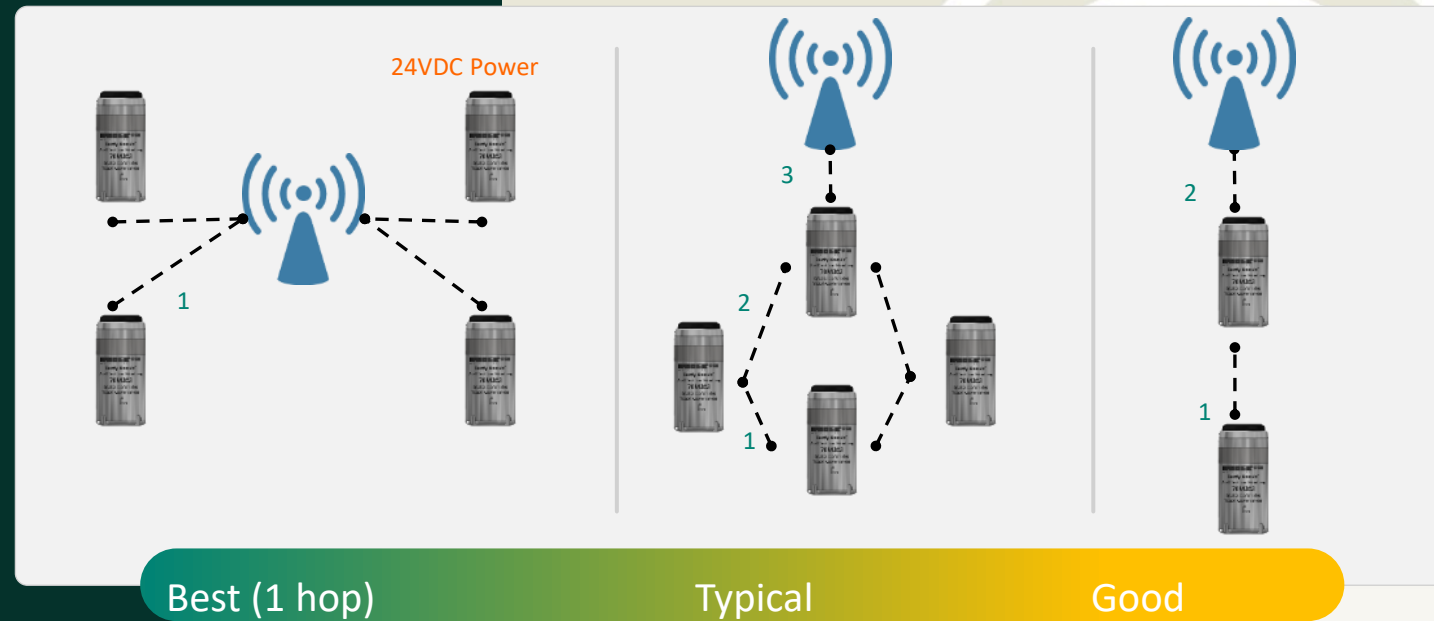
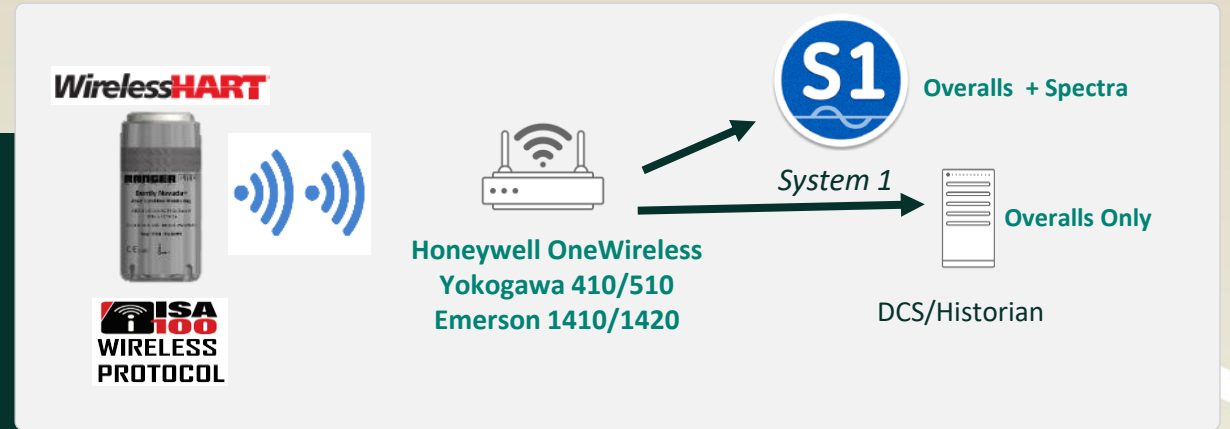
- XYZ
- or Z-axis only

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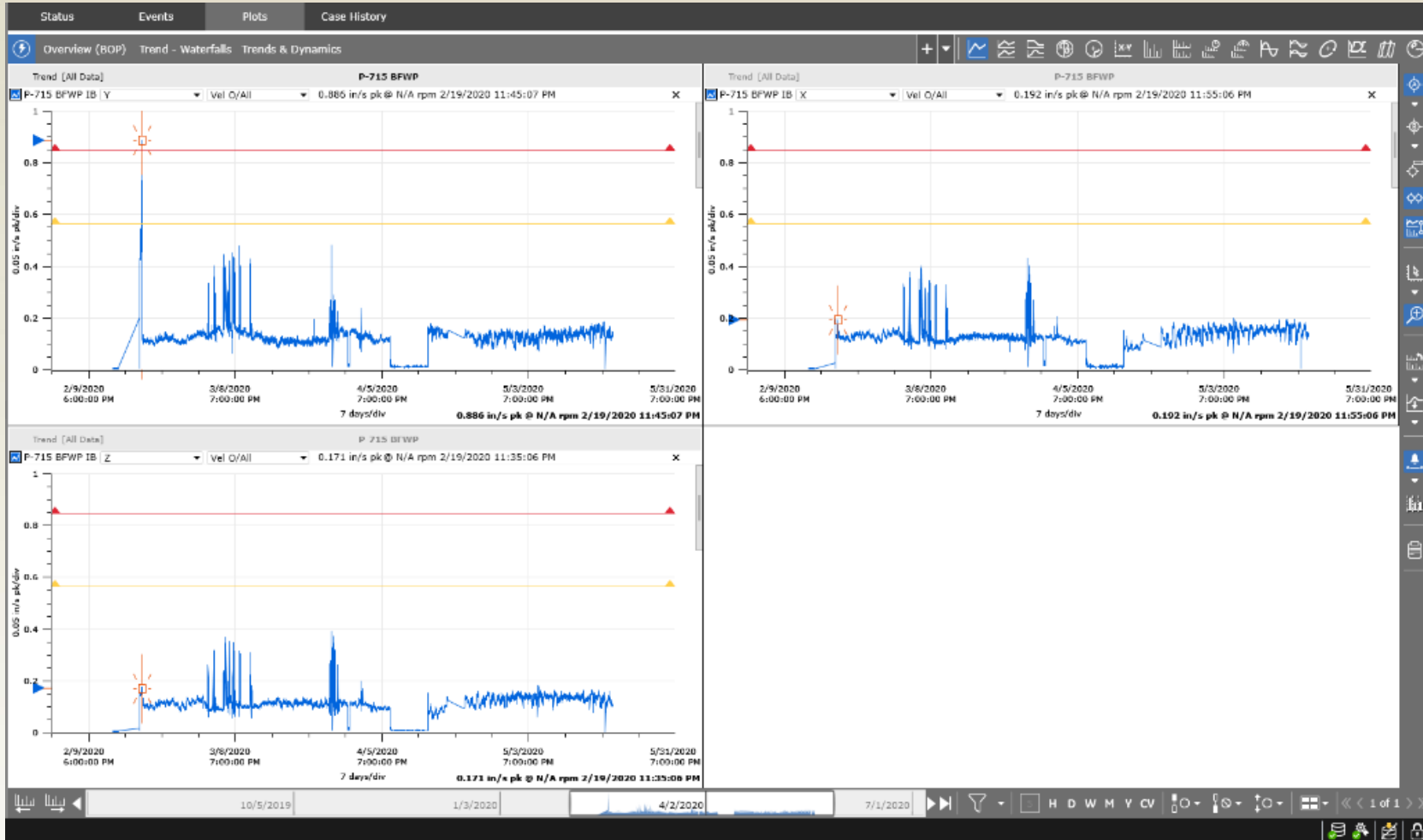


# Network & Installation





# Boiler Feed Water Pump (Dead-Heading)

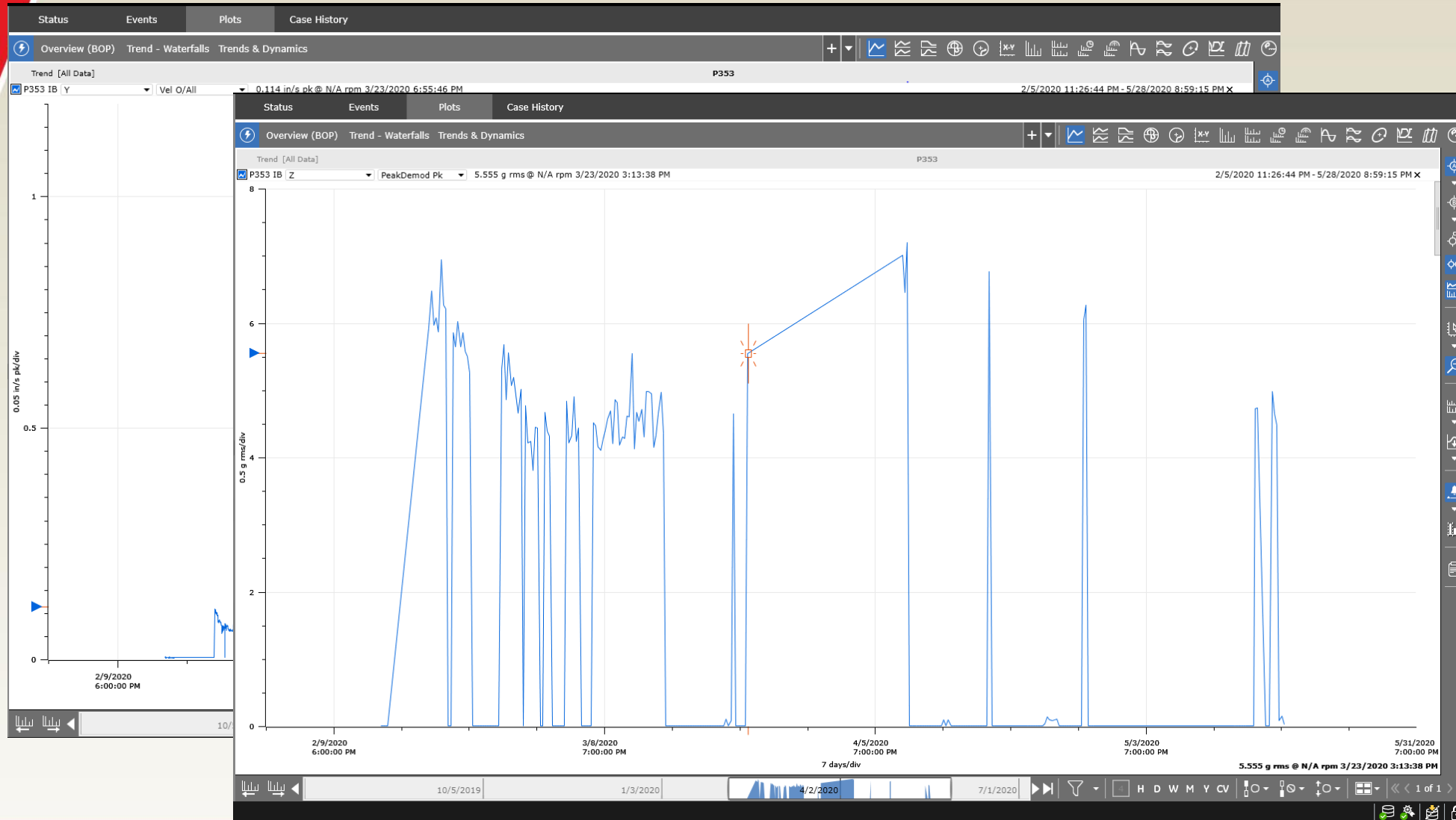


## Boiler Water feed pump

- Recirculates water when the boiler is not using it
- **Dead-heading** is occurring during the recirculating period
- Prior portable route data did not reveal ... once per month vs. continuous



# Scrubber Pump (Over Lubrication)



## Scrubber Pump

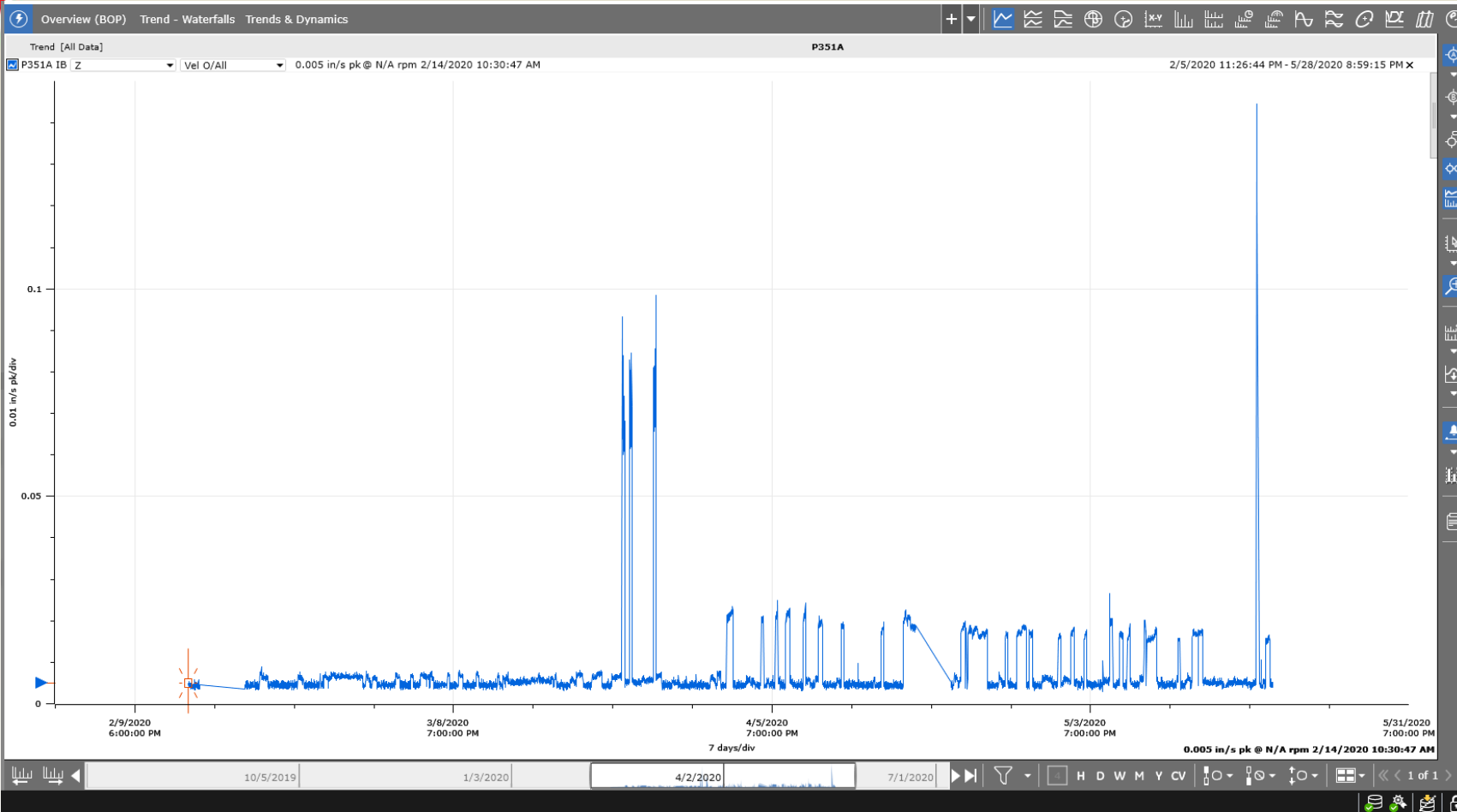
- Overall velocity vibration reading is steady
- Peak Demod trend is 6x higher compare to a sister pump
- Pump checked ... **over lubrication**



# Scrubber Pump (Motor Failure)

## Scrubber Pump/Motor

- Ranger Pro on pump only
- Vibration level is low prior to the spikes
- After the spikes, the vibration is trending higher overall. The sensor sees 0.5 IPS
- Motor failed shortly after spikes
- Customer said ... “would have easily caught if on both pump and motor”



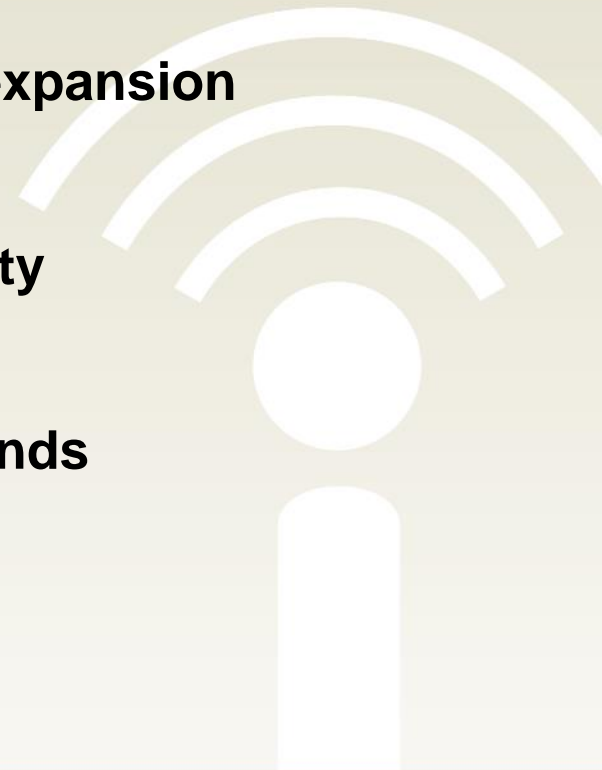
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# Summary

- **Investment:** Cost effective for additional plant wide asset coverage
- **Installation and Deployment:** Ease of deployment and/or expansion
- **Performance:** ISA100 Wireless enables data integrity and security
- **Choice:** Large portfolio of other ISA100 Wireless devices measurands



# ISA100 Wireless Adoption Development Eco-system

## WCI ISA100 Wireless Rapid Development Kit

- Everything you need to develop an ISA100 Wireless (IEC 62734) connected field instrument
- Develop ISA100 Wireless (IEC 62734) compliant and certifiable field instruments with minimal effort using application layer code provided
- Includes reference hardware design for ISA100 Wireless (IEC 62734) field instrument implementation
- Certified WISA modules run ISA100 Wireless communication stack
- User friendly SPiN development board includes OLED display and a large variety of sensors



<https://centerotech.com/product/wci-isa100-rapid-development-kit/>

# Online Resources

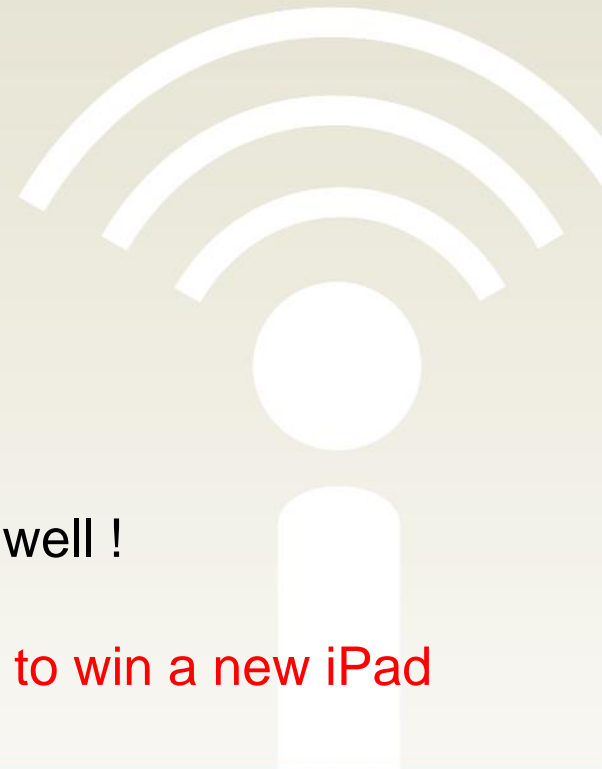


[www.isa100wci.org](http://www.isa100wci.org)

- Learning Center with White Papers
- Articles, End-user stories, Forum
- Receiving over 20,000 web views per month
- Full list of certified/registered ISA100 Wireless devices
- And more useful content for you and your business

**LinkedIn** [ISA100 Wireless Interest Group](#)

- Latest news, end-user and expert discussions, insights
- 1180+ members and growing; please join and invite your peers to join as well !
- Receiving over 5,000 web views per month
- **Limited Time Offer: Join the group and you will be entered in a prize draw to win a new iPad**



# ISA100 Wireless Interest Group

## Limited Time Promotion



Scan the QR code and join the ISA100 Wireless LinkedIn group. If you join during our limited time offer, you will be entered in a prize draw to win a new iPad!





**THANK  
YOU**

**For Your Attention!**



# Questions?



[Ranger Pro](#)

Additional information and details

[Bently Nevada Interest Group](#)

8100+ members and growing



[www.isa100wci.org](http://www.isa100wci.org)



[ISA100 Wireless Interest Group](#) 

1180+ members and growing; please join and invite your peers to join as well !

Chris McMillen

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