JPS Reliability

A Reliable Plant is a Profitable Plant

PROfessional services for PROactive maintenance

info@jpsreliability.com https://jpsreliability.com

Registered in England: 12547245. VAT. No: 346156693

SENSOTEQ KAPPA X TRIAL

- Technical management JPS Reliability Ltd
- **Kappa X Wireless Sensor** (Developed by Sensoteq and RMS)

Sensoteq RMS
RELIABILITY MAINTENANCE SOLUTIONS

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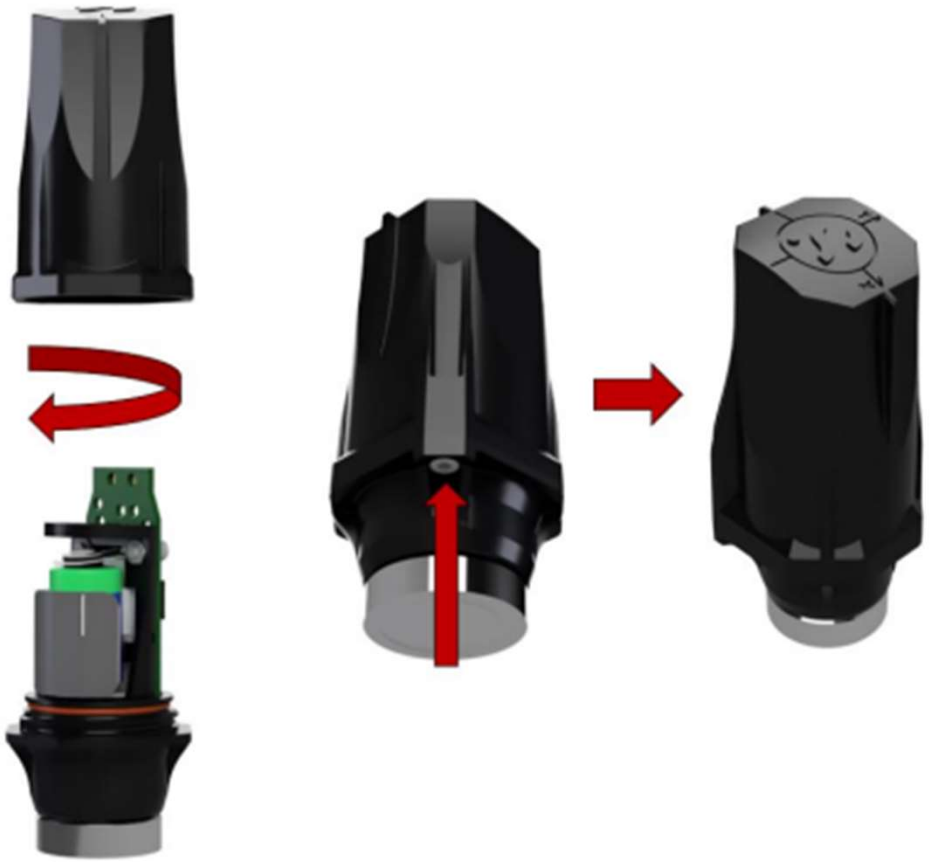

Kappa X

- Tri-Axial Sensor (X,Y,Z)
- Atex Zone 0 approval process ongoing
- 10KHz Fmax / 5KHz / 5Khz , 3200 – 6400 LOR
- 64G Peak Vibration (128G Pk-Pk)
- Auto ranging
- IP69K Ingress Protection
- 5 Year Battery (User Replaceable)
- Standard ½ AA Size Battery for easy replacement with a T8
- Intelligent sleep mode
- 1 min sampling rate / Temp / Vib RMS Pk-Pk
- Long Term Spectrum, Time Waveform, Power bands (24hr)
- Wireless Radio Frequency Sub 1GHz (ISM) (Increased range/integrity)
- Very small profile base 36mmx36mm – 78mm height

Sensoteq Kappa X Trial

- Set up easy
- Plug and Play Technology
- Feedback from first set of data
- 89 Meter Length Drier

Sensoteq RMS
RELIABILITY MAINTENANCE SOLUTIONS

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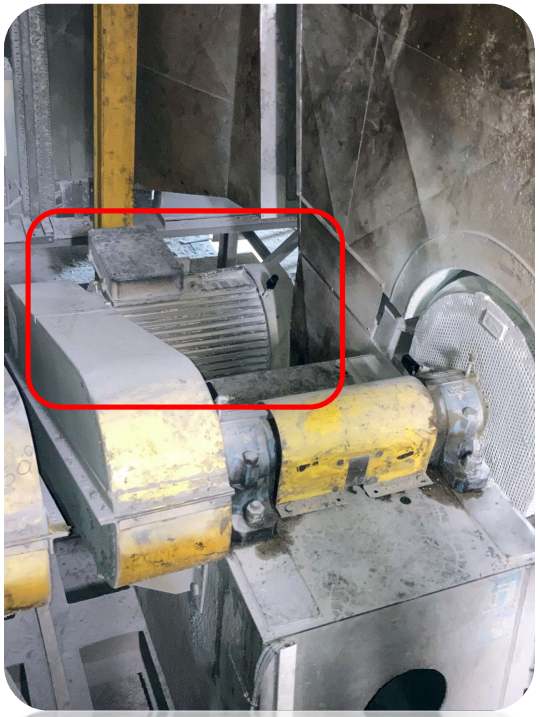
Dryer Fan

Circulating Fan

NDE Fan Bearing

DE Fan Bearing

Dryer Fan Motor

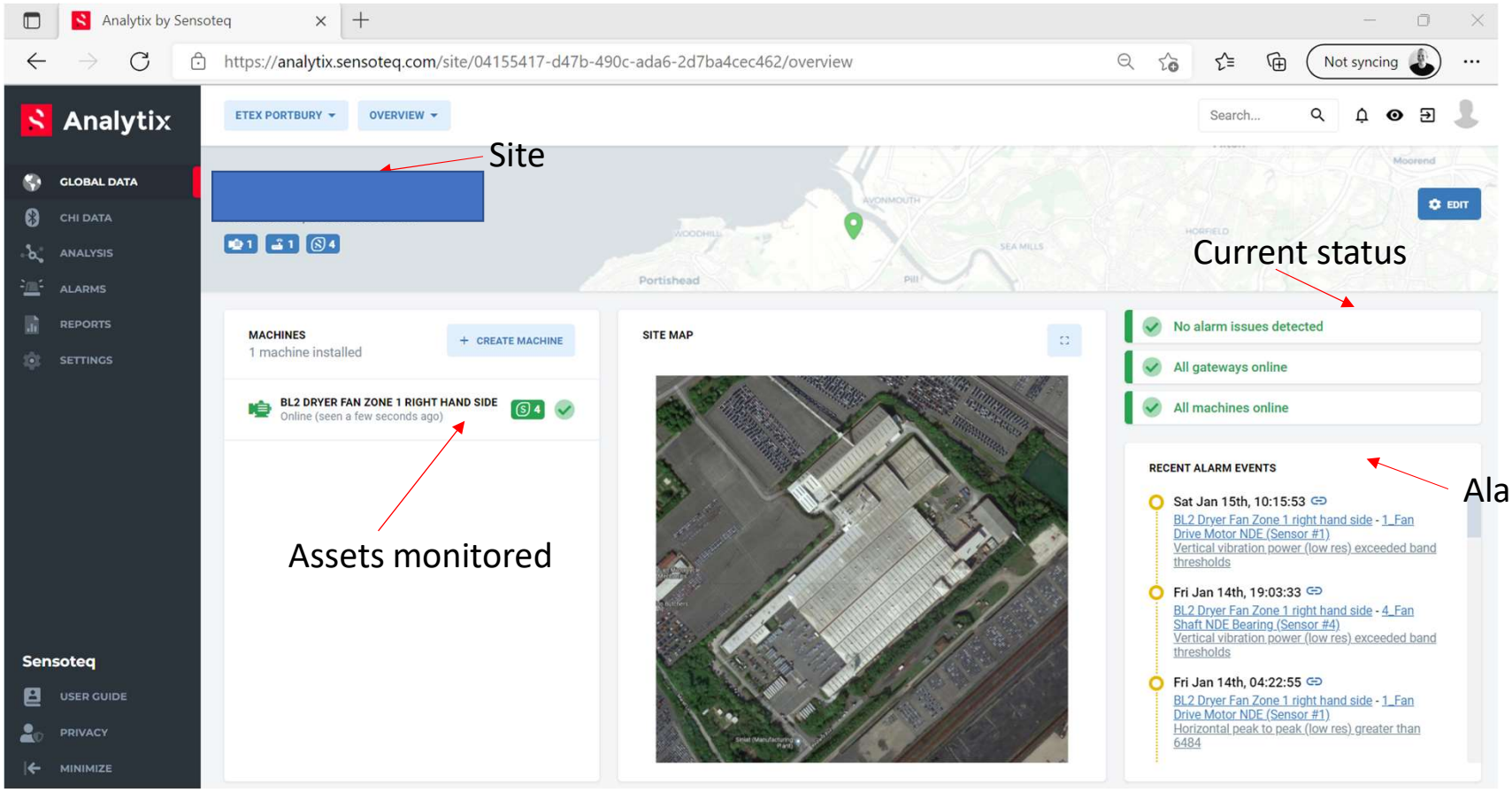


Circulating Fan

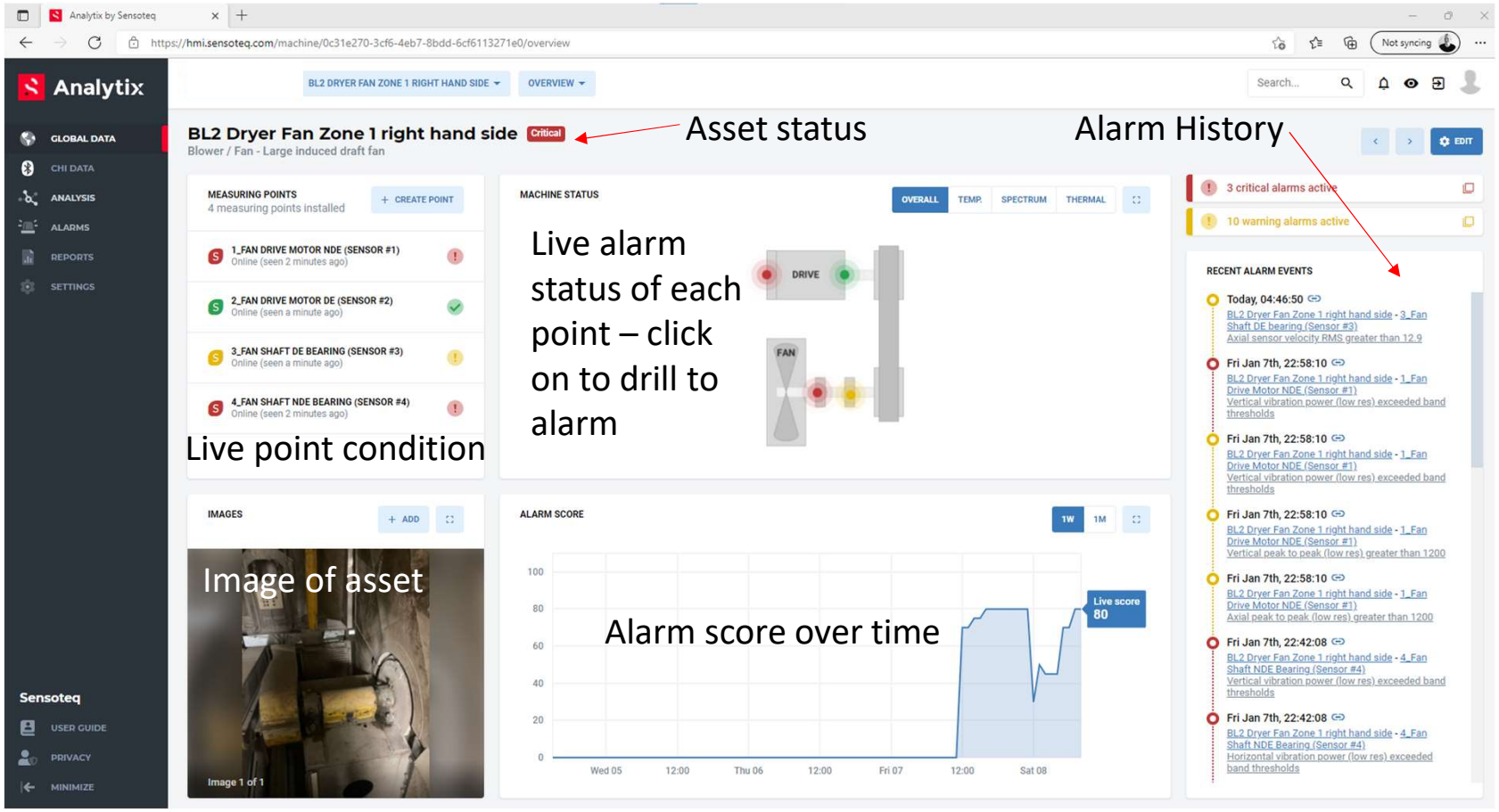
NDE Motor Bearing

DE motor Bearing

Cloud Platform



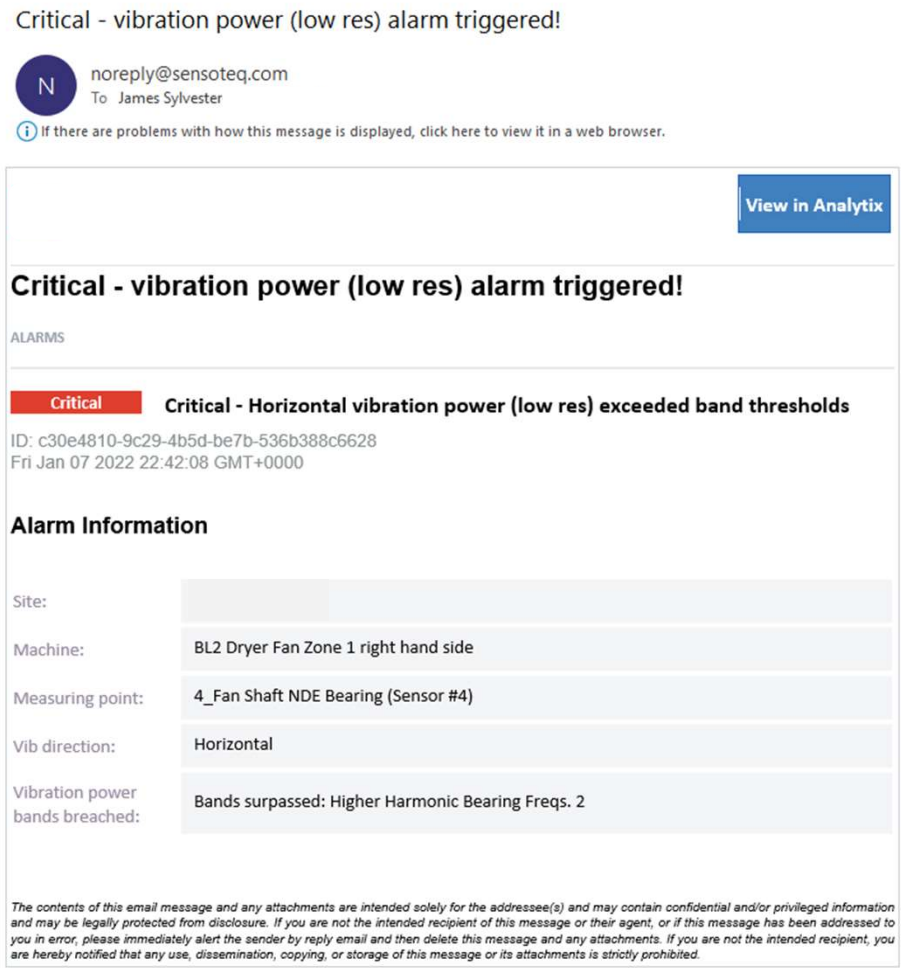
Cloud Platform




Sensoteq
RMS
JPS Reliability
A Reliable Plant is a Profitable Plant
Data Review
Day 1

Fan NDE Email Alarm Overnight

Less than 24hrs after placing the sensor on the bearing.



Critical - vibration power (low res) alarm triggered!

noreply@sensoteq.com
To James Sylvester

If there are problems with how this message is displayed, click here to view it in a web browser.

View in Analytix

Critical - vibration power (low res) alarm triggered!

ALARMS

Critical **Critical - Horizontal vibration power (low res) exceeded band thresholds**

ID: c30e4810-9c29-4b5d-be7b-536b388c6628
Fri Jan 07 2022 22:42:08 GMT+0000

Alarm Information

Site:	
Machine:	BL2 Dryer Fan Zone 1 right hand side
Measuring point:	4_Fan Shaft NDE Bearing (Sensor #4)
Vib direction:	Horizontal
Vibration power bands breached:	Bands surpassed: Higher Harmonic Bearing Freqs. 2

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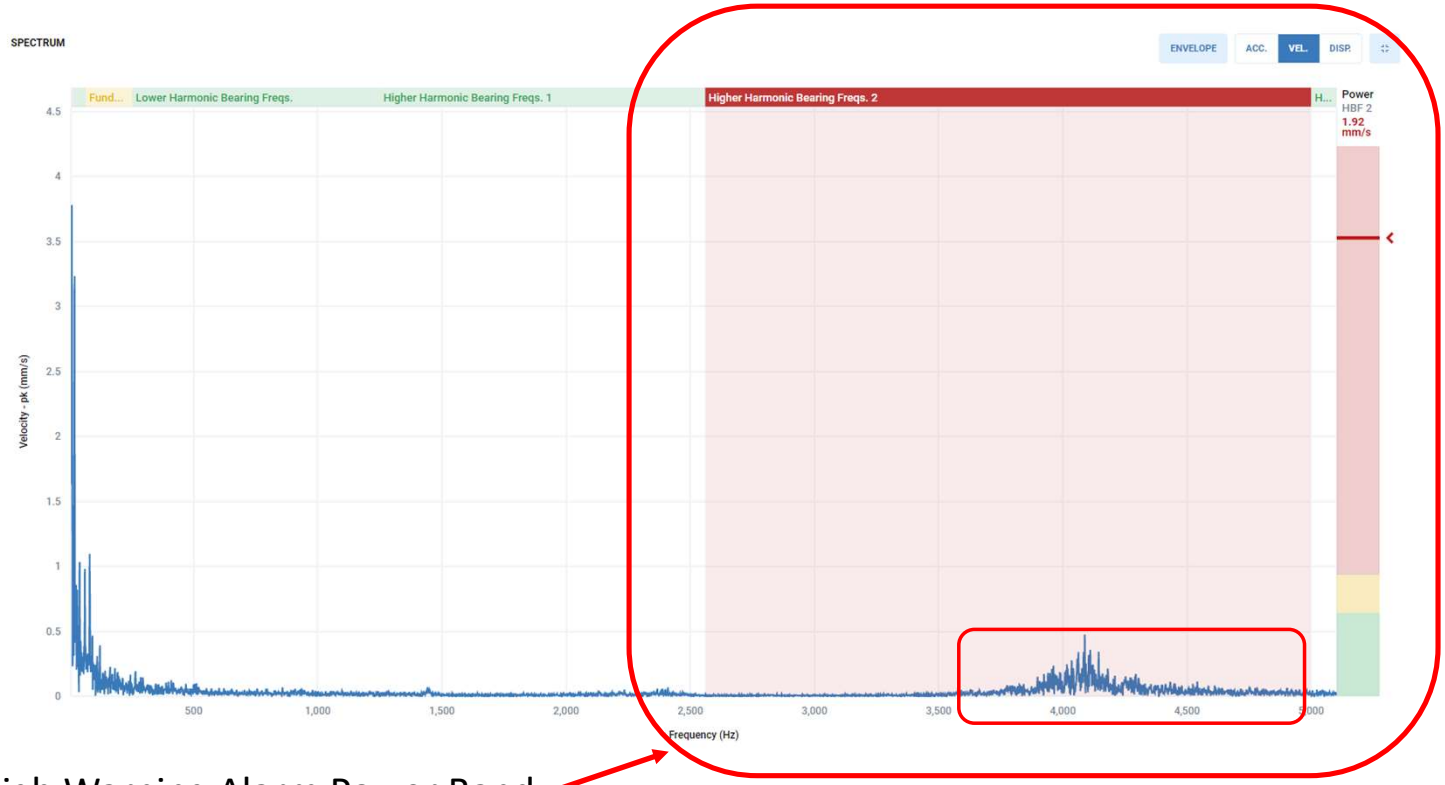
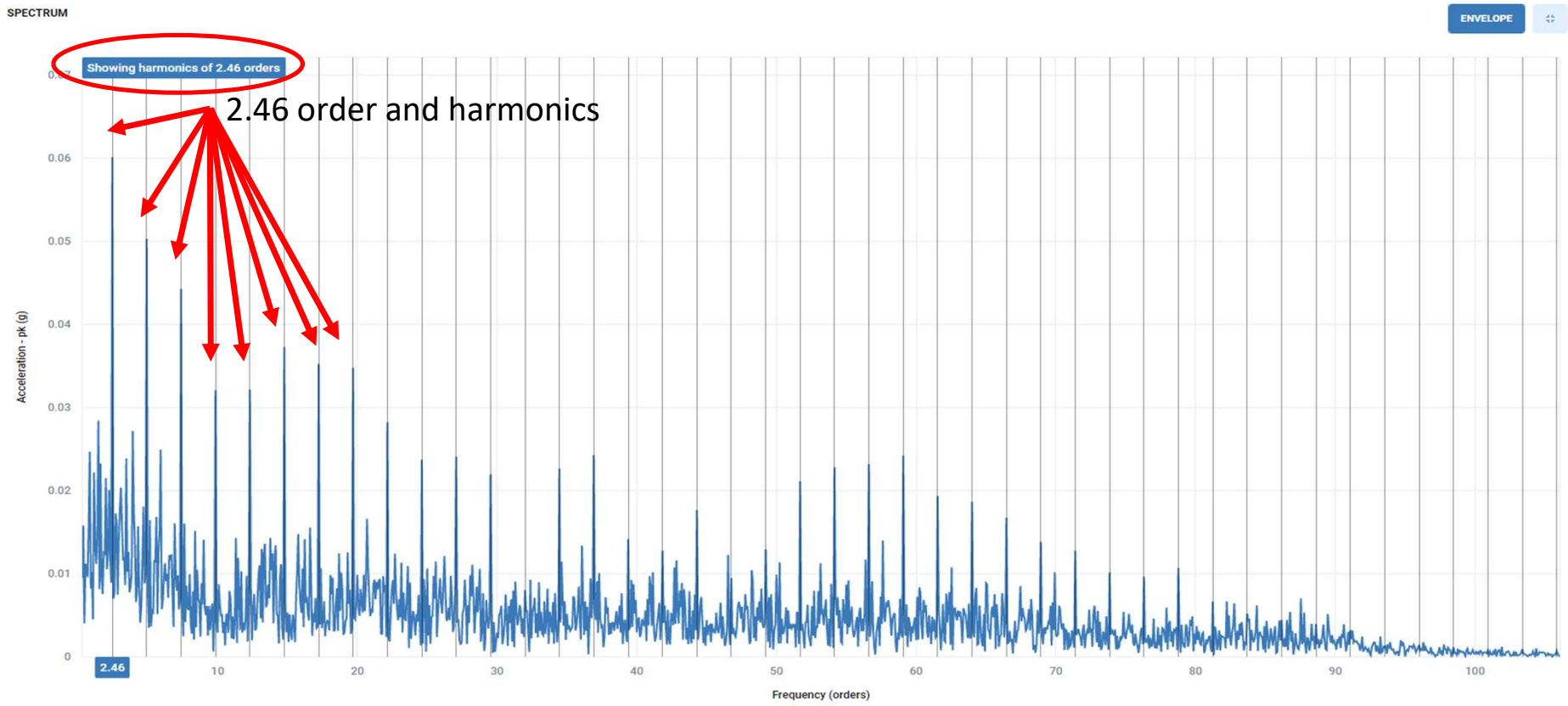
Power Band Alarming in Velocity

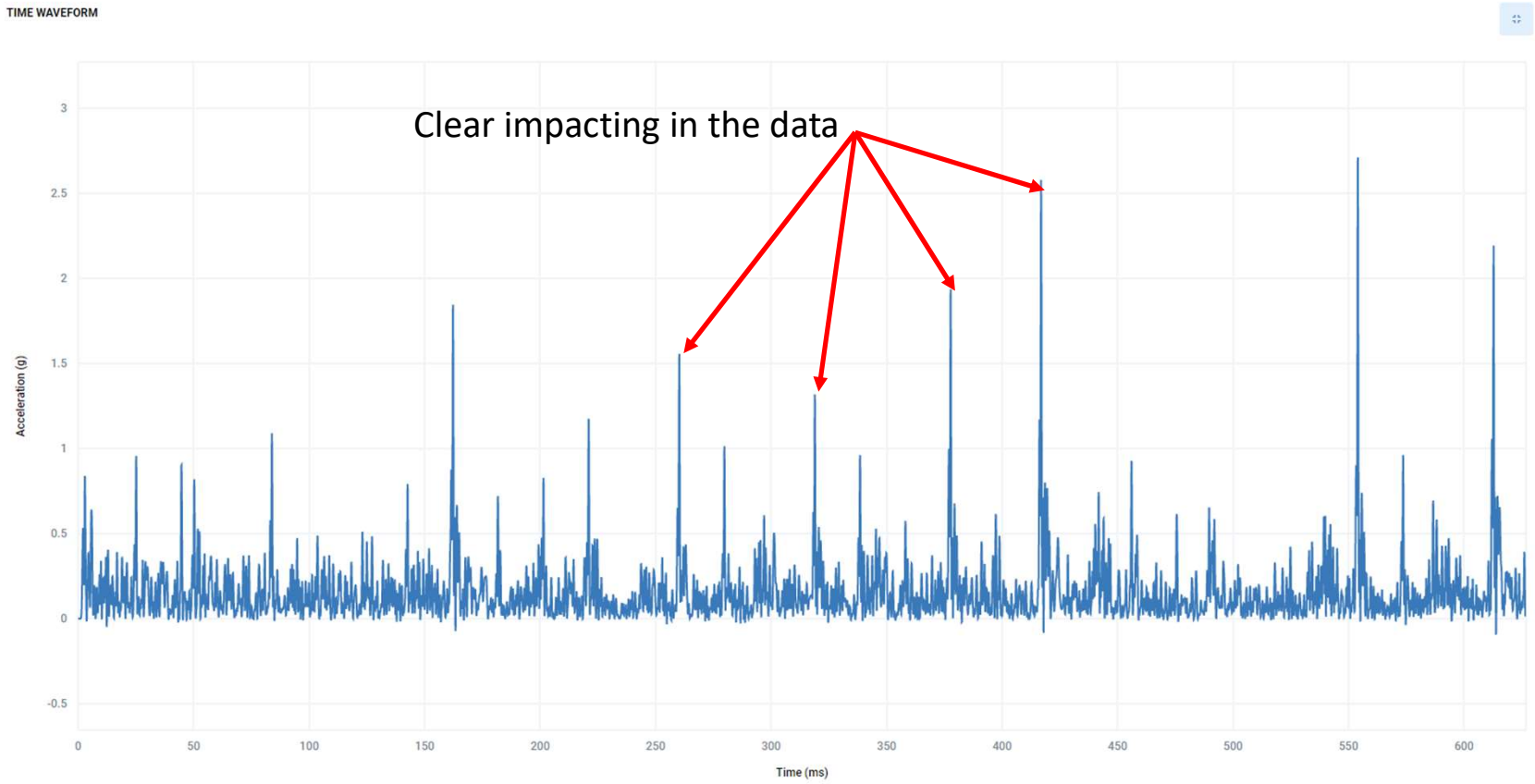


High Warning Alarm Power Band

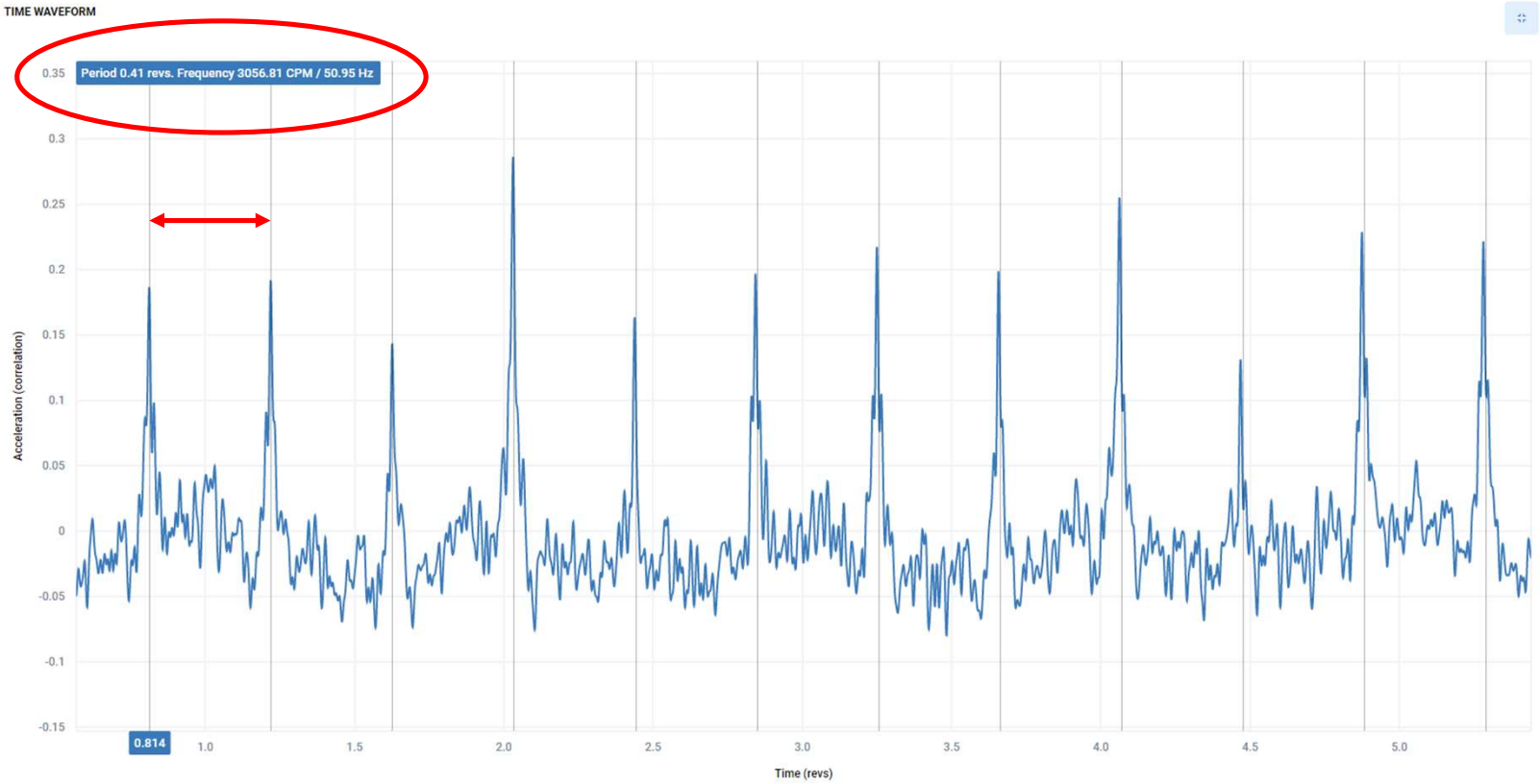
Envelope spectrum Fan NDE



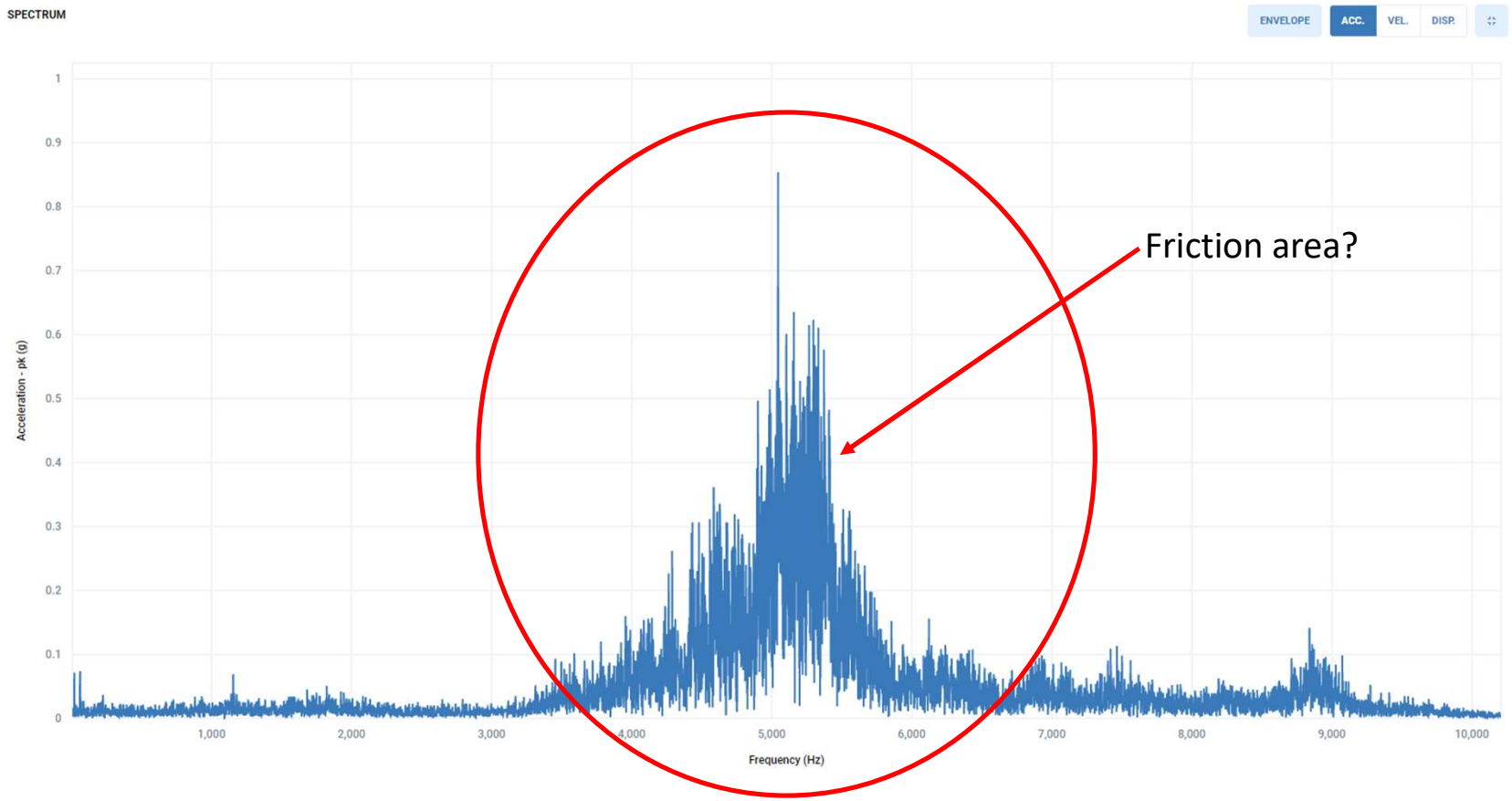
Envelope Time waveform impacting



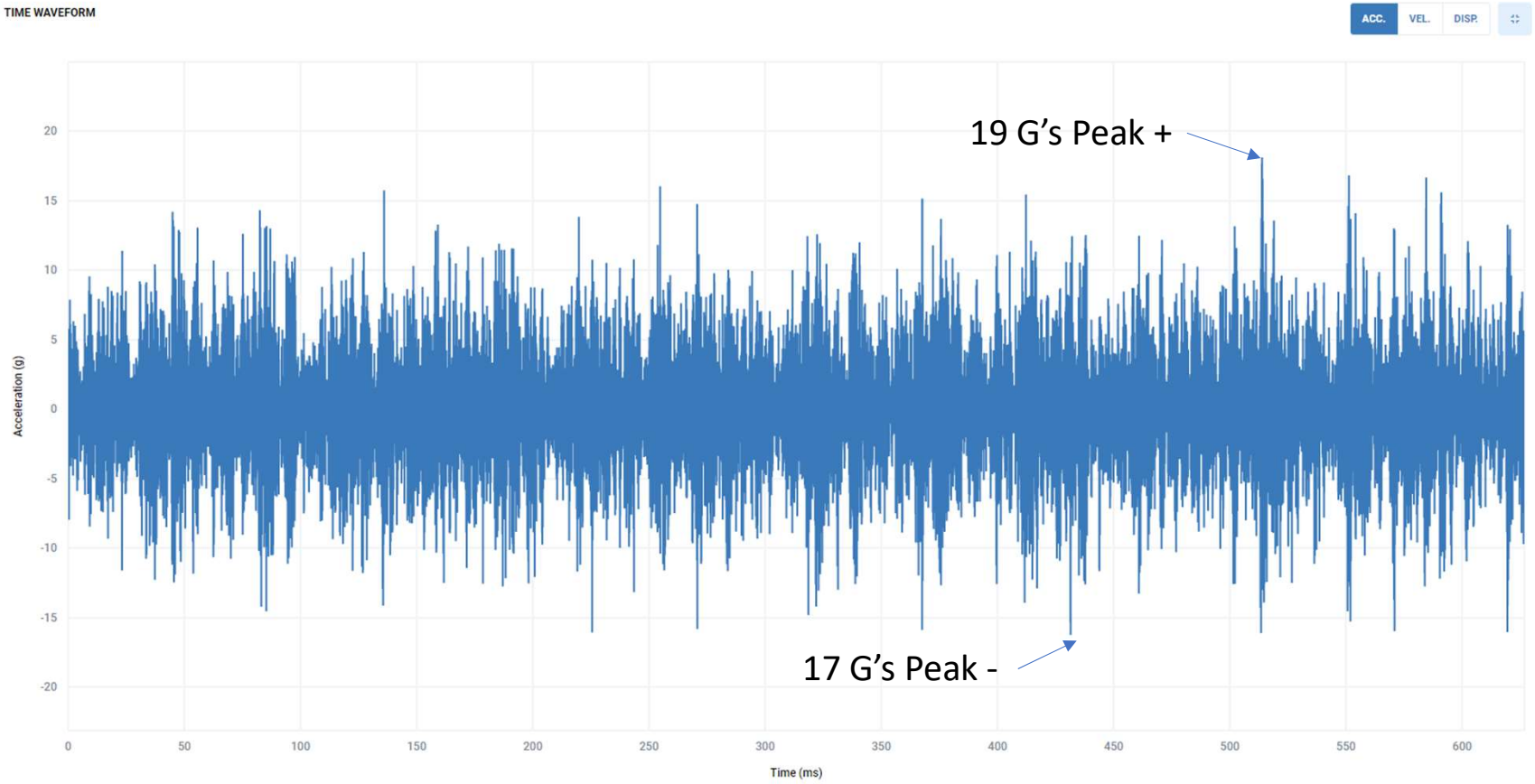
Envelope Time waveform Autocorrelated 0.41 orders



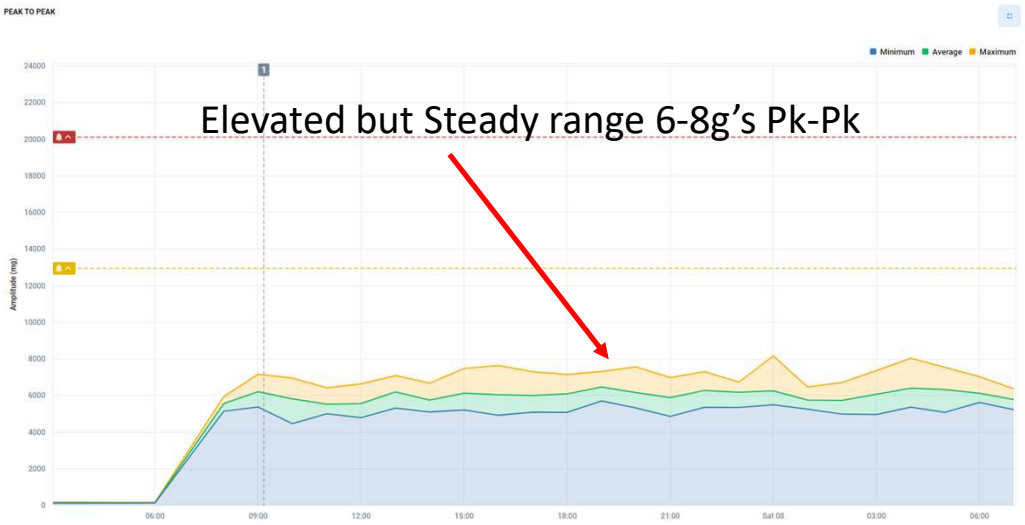
10KHz Acceleration Spectrum



Acceleration TWF (full spectrum)

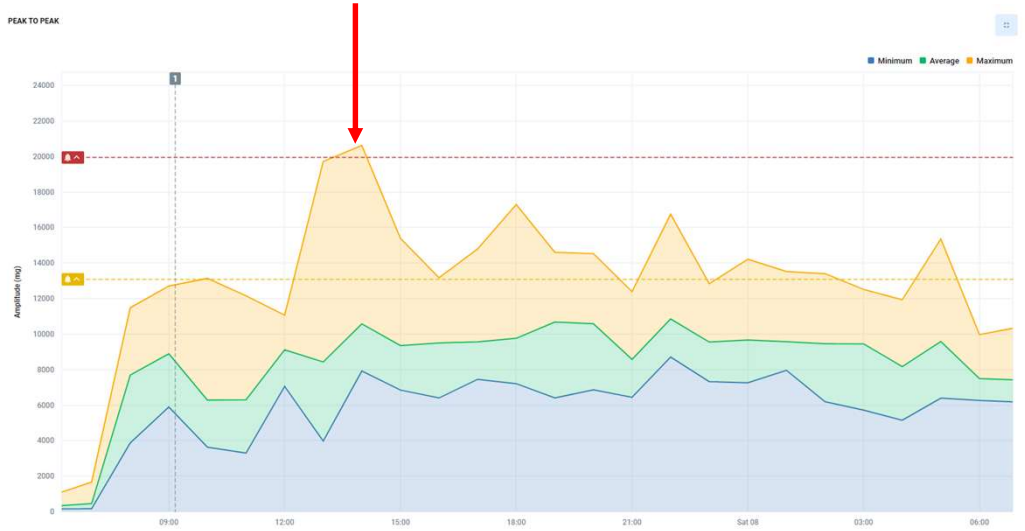


Fan NDE and DE Pk-Pk Acceleration Trends



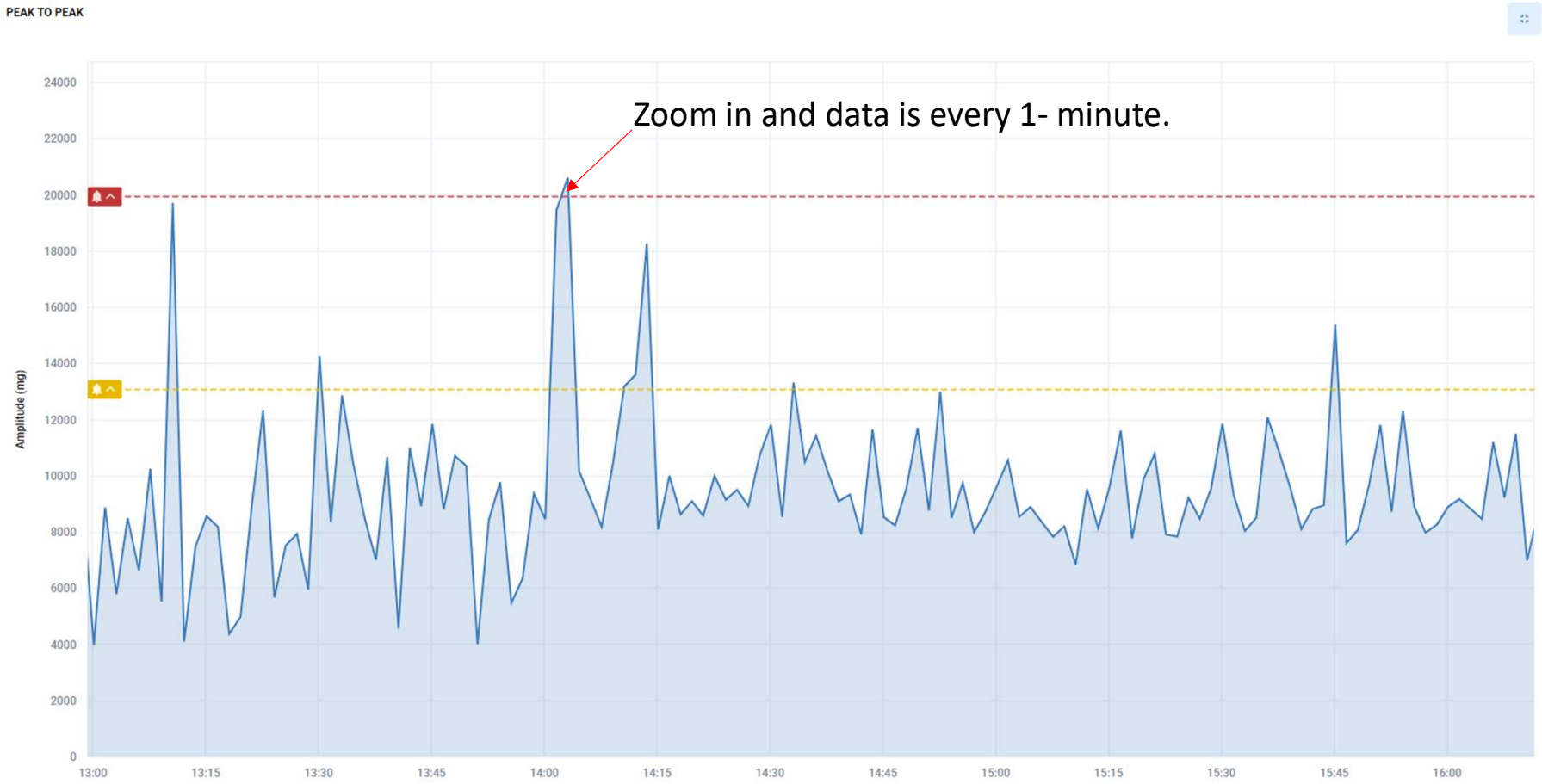
Fan DE Trends 1 Day (1hr interval)

A lot more activity up to 20g's Pk-Pk



Fan NDE Trends 1 Day (1hr interval)

Fan NDE and DE Pk-Pk Acceleration Trends



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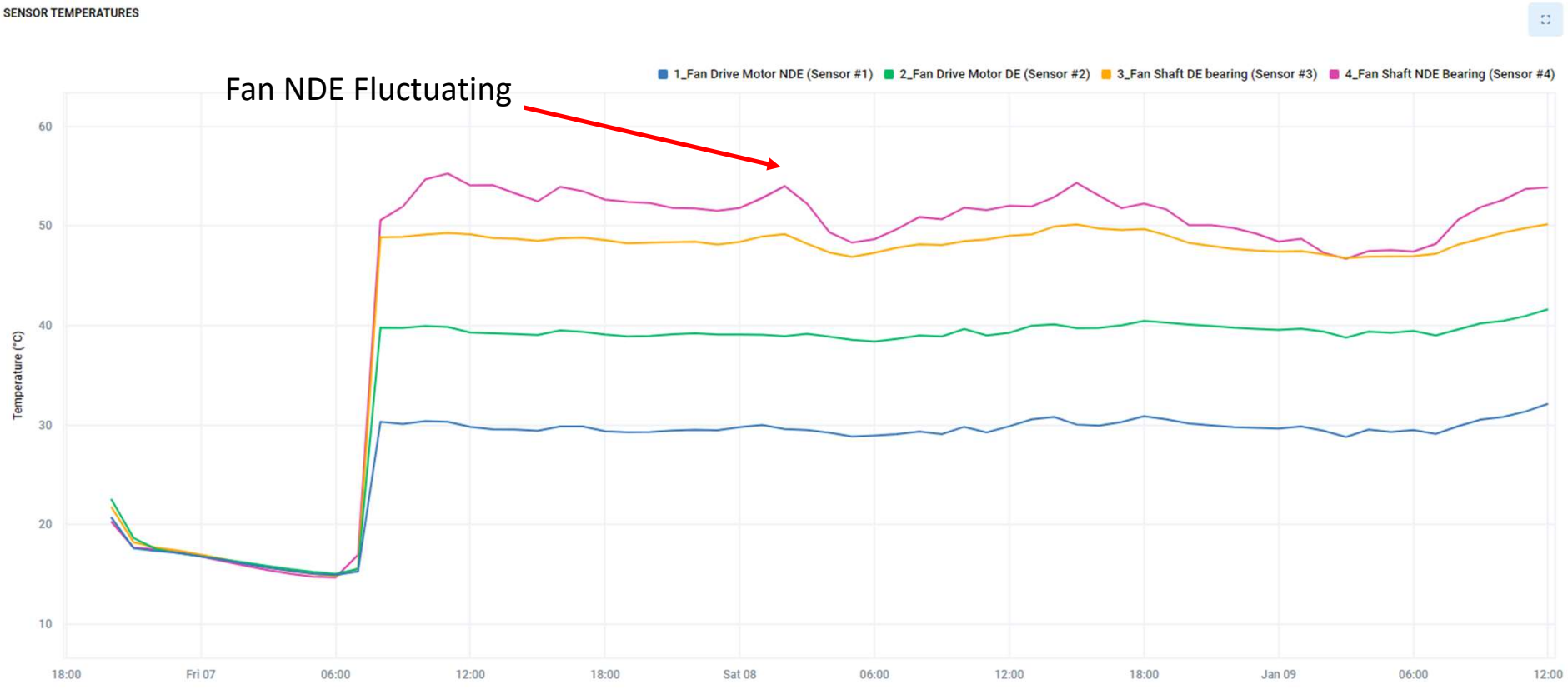
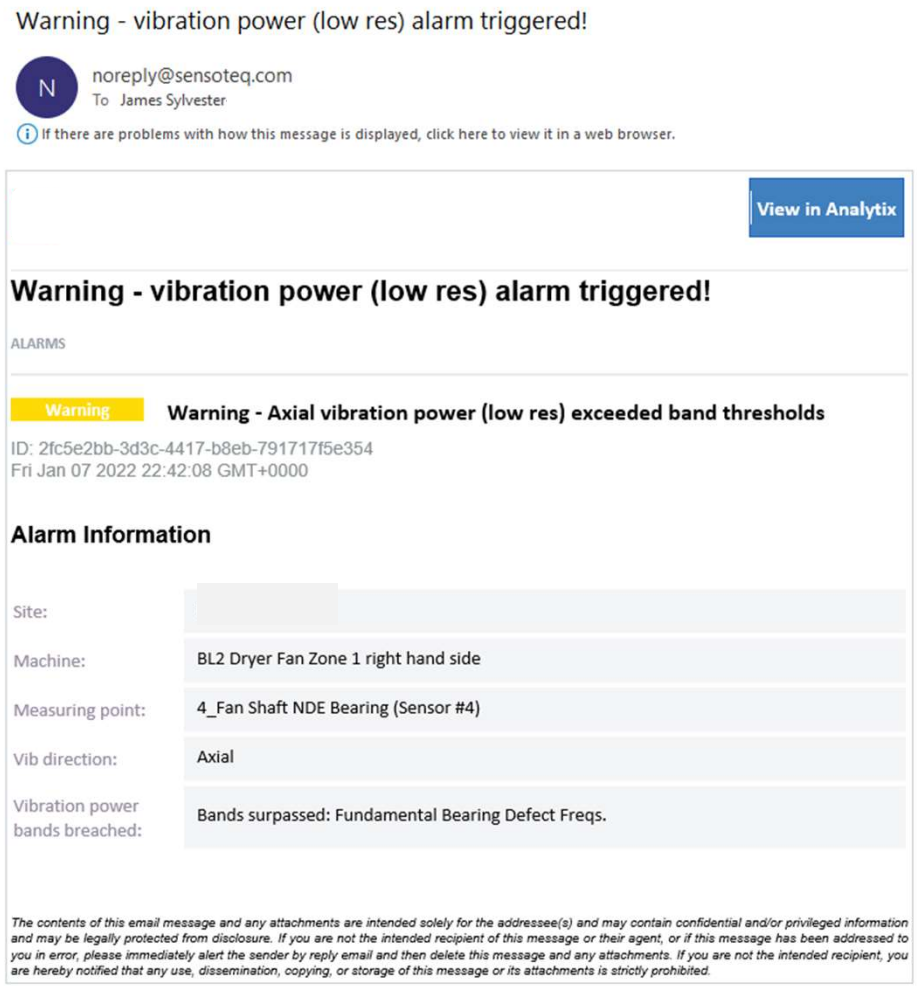
Asset Sensor Temperature Trends



Motor NDE Email Alarm Overnight

Less than 24hrs after placing the sensor on the bearing.



Warning - vibration power (low res) alarm triggered!

N noreply@sensoteq.com
To James Sylvester

If there are problems with how this message is displayed, click here to view it in a web browser.

View in Analytix

Warning - vibration power (low res) alarm triggered!

ALARMS

Warning **Warning - Axial vibration power (low res) exceeded band thresholds**

ID: 2fc5e2bb-3d3c-4417-b8eb-791717f5e354
Fri Jan 07 2022 22:42:08 GMT+0000

Alarm Information

Site:	
Machine:	BL2 Dryer Fan Zone 1 right hand side
Measuring point:	4_Fan Shaft NDE Bearing (Sensor #4)
Vib direction:	Axial
Vibration power bands breached:	Bands surpassed: Fundamental Bearing Defect Freqs.

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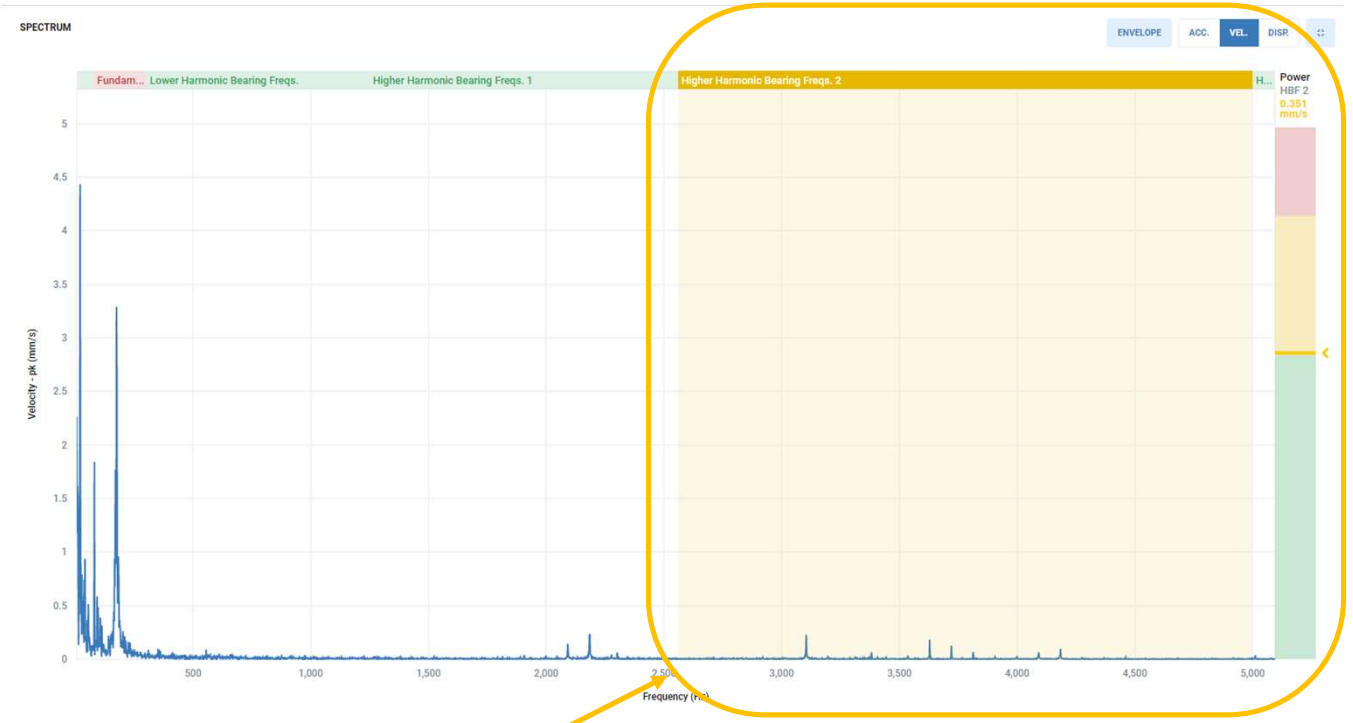
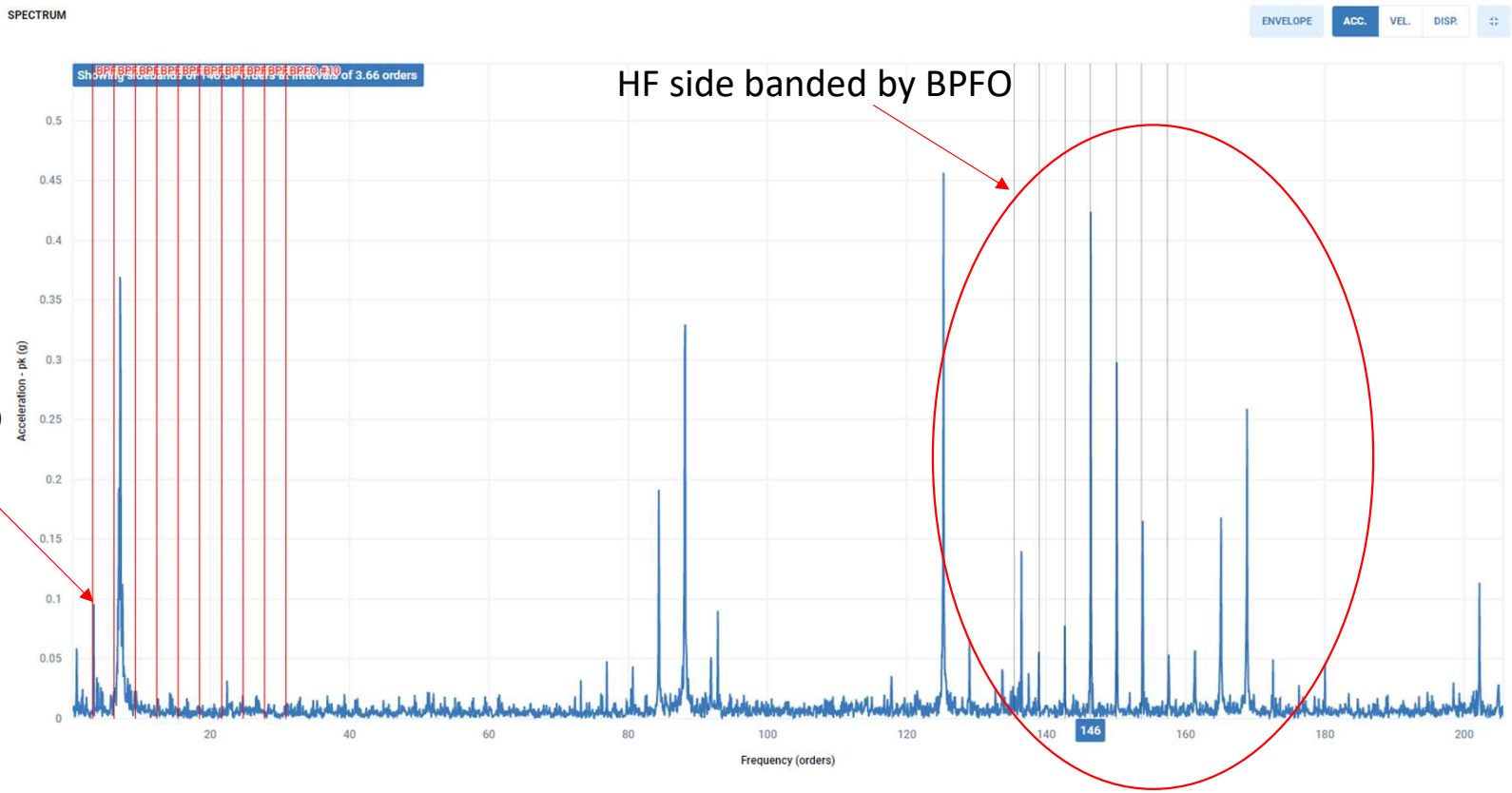
Power Band Alarming in Velocity

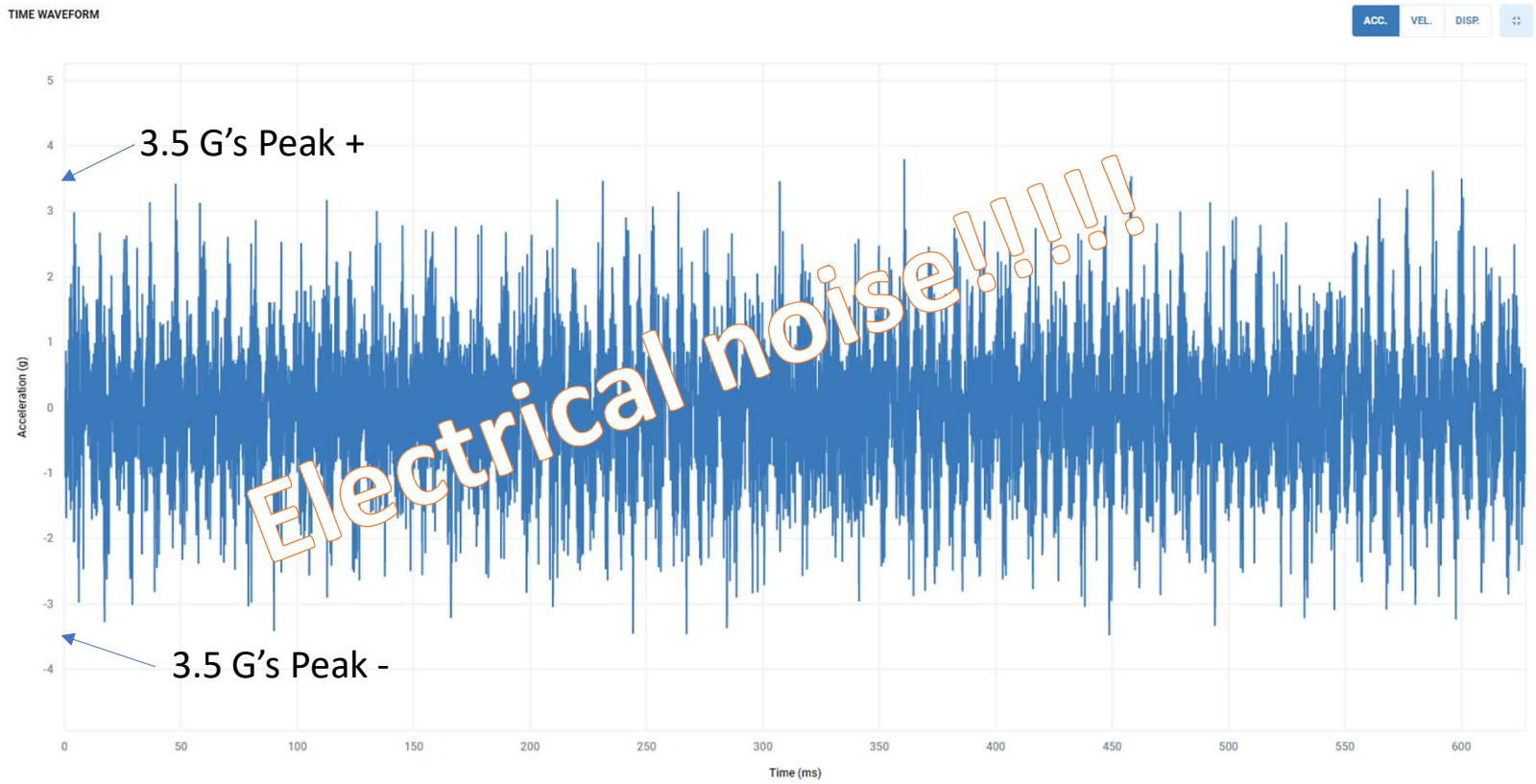


Early Warning Alarm

Acceleration spectrum – sings of BPFO due to VSD



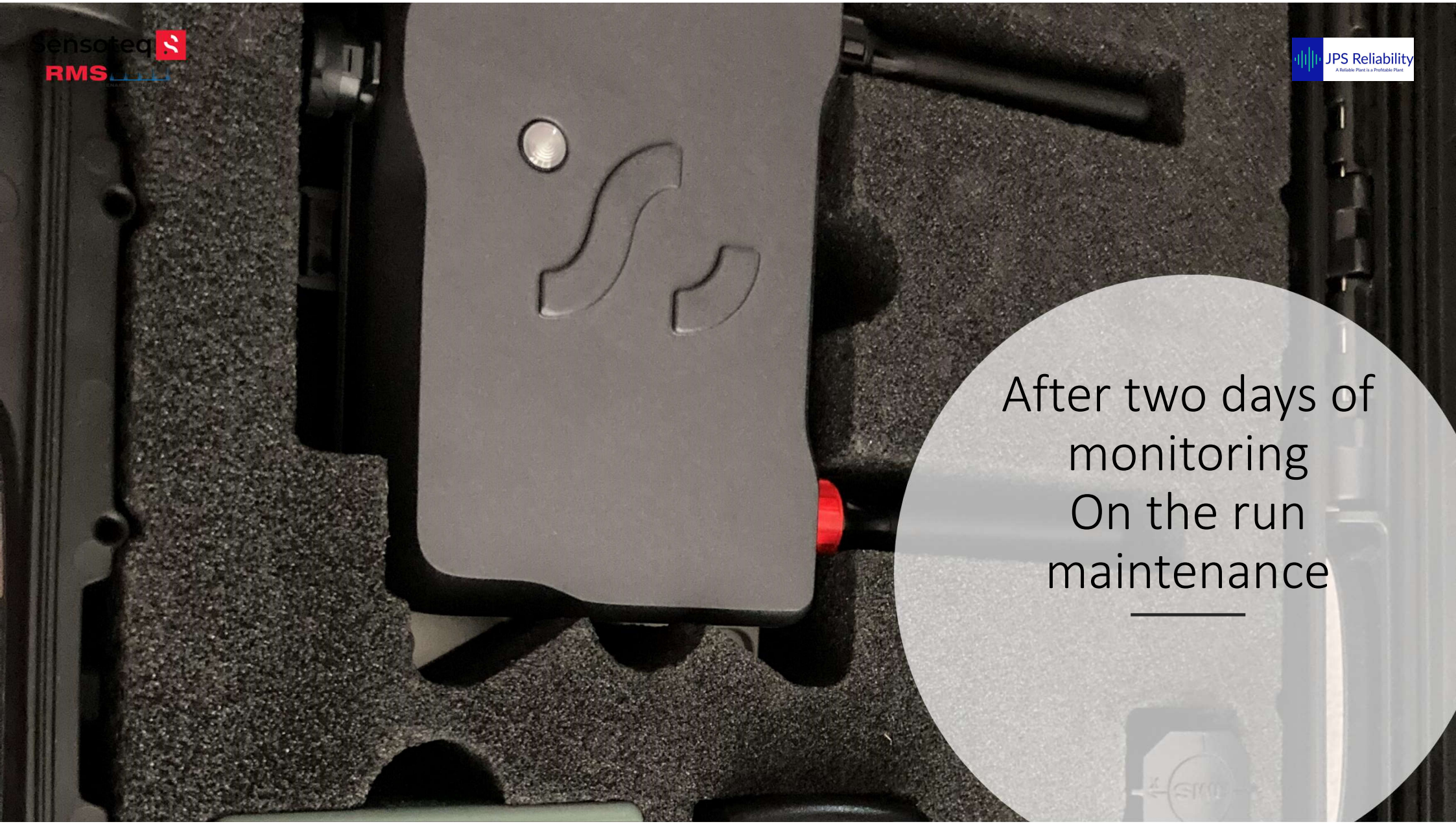
Motor NDE Acceleration TWF



Day 1 Data Review Summary

1. The wireless system is resolving the know motor electrical anomaly due to the variable speed drive operation.

2. The wireless system has highlighted a potential reliability issue with the fan NDE bearing.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JPS Reliability
A Reliable Plant is a Profitable Plant
After two days of monitoring
On the run maintenance

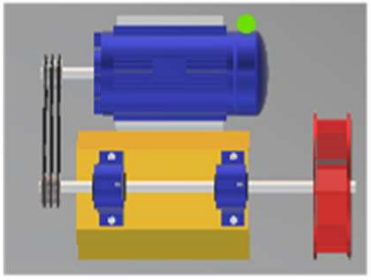
Temperature Comparisons

- Temperature manually rerecorded with a thermal gun compared to the sensors. Data taken 10:40-10:44
- Motor NDE = **52.9°**
- Motor DE = **63°**
- Fan BRG DE = **61°**
- Fan BRG NDE = **71°**

Maintenance Actions – Controlled Lubricaiton

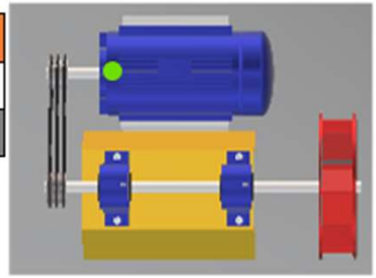
MOTOR NDE

Before Grease	After Grease
12:00	12:03
46 dB's @ 25kHz	46 dB's @ 25kHz



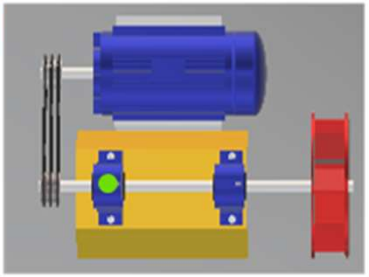
MOTOR DE

Before Grease	After Grease
12:06	12:08
43 dB's @ 25kHz	33 dB's @ 25kHz



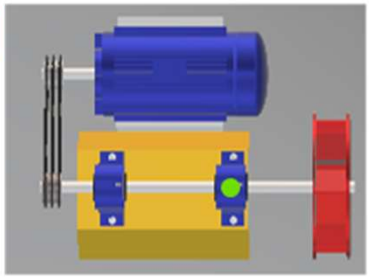
FAN DE BRG

Before Grease	After Grease
11:35	11:38
58 dB's @ 22kHz	44 dB's @ 22kHz



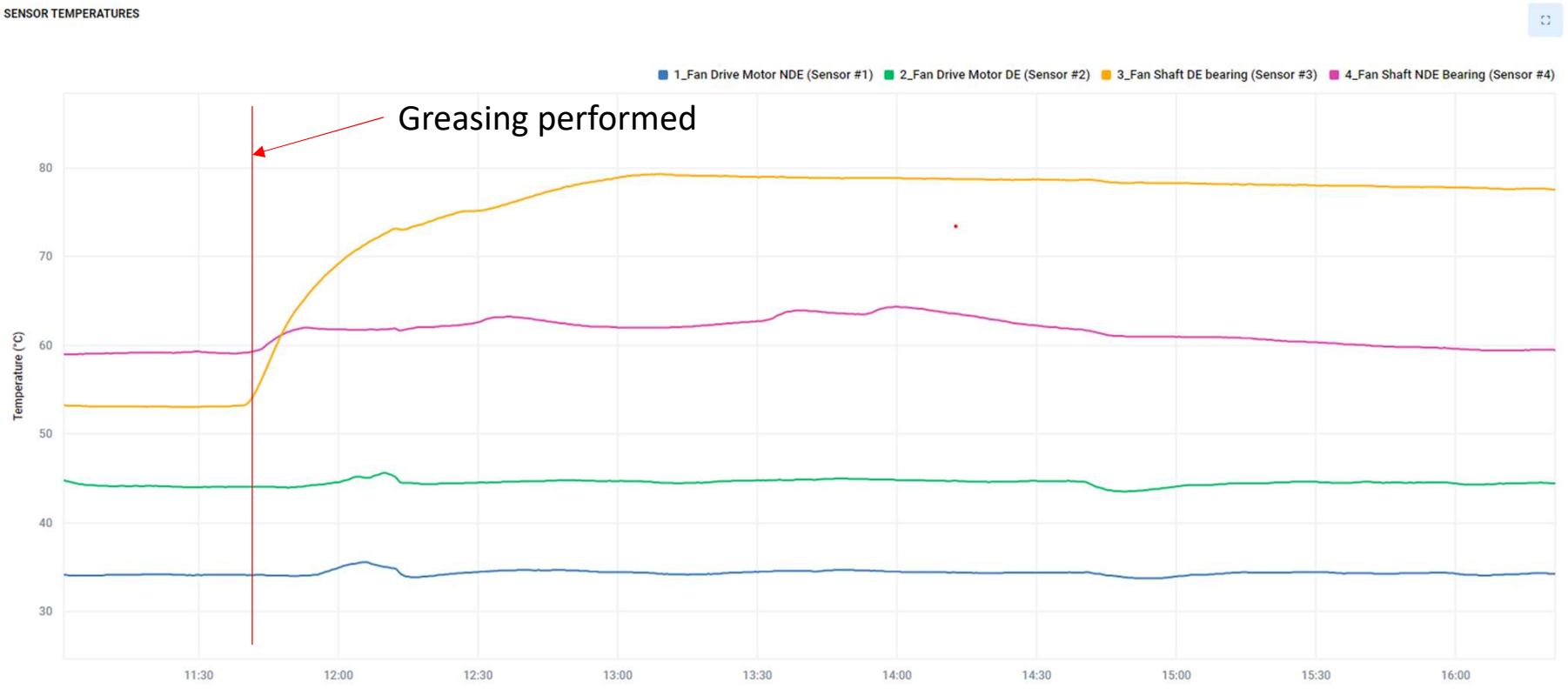
FAN NDE BRG

Before Grease	After Grease
11:30	11:40
53 dB's @ 22kHz	34 dB's @ 22kHz



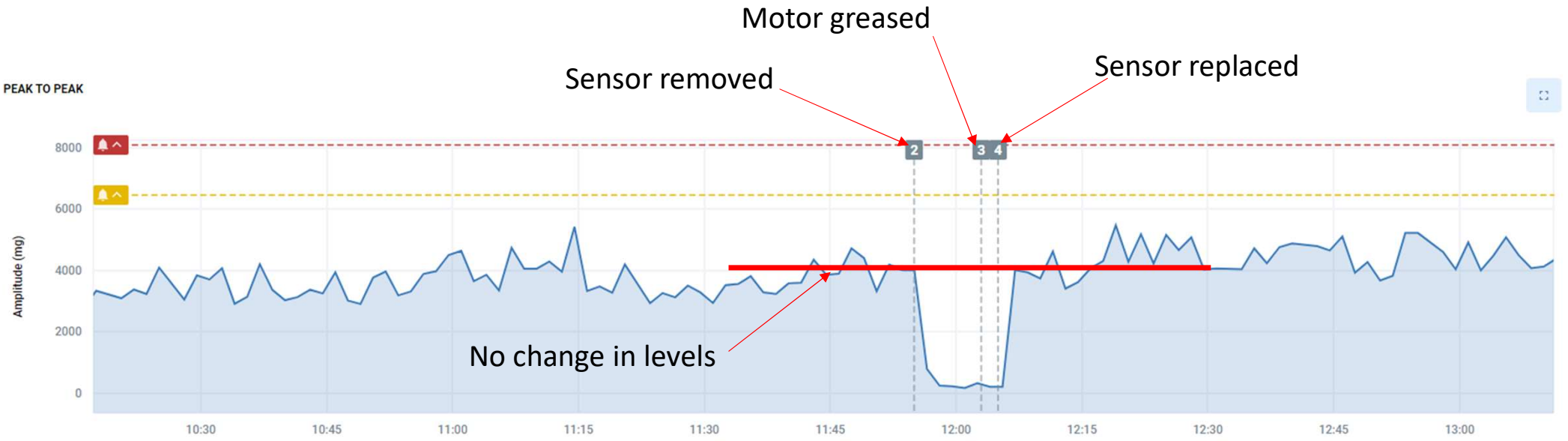
Performed by Matt Blacker

Sensor Temperature After Greasing



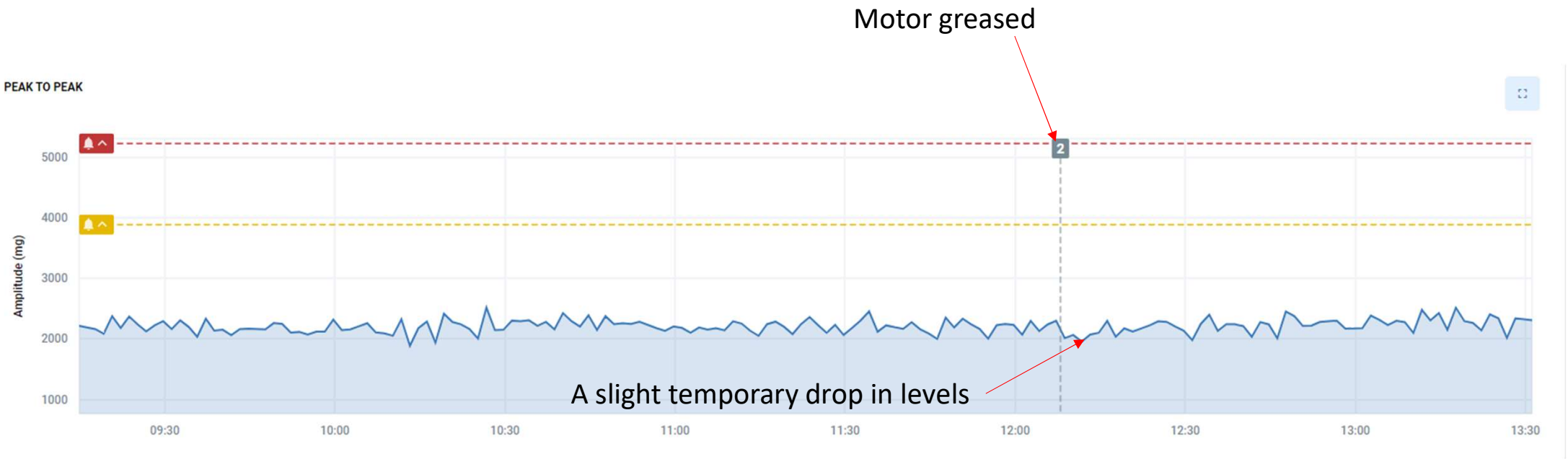
Motor NDE

No change in the dB on greasing – No change in the VA data



Motor DE

43dB to 33dB on greasing – Slight temporary change in the VA data

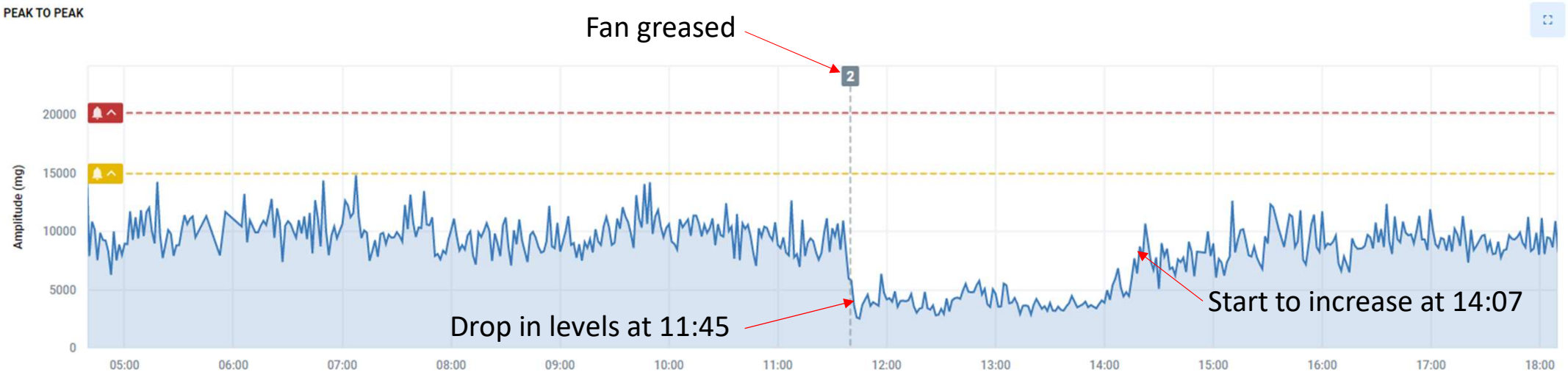


Fan DE

58dB to 34dB on greasing – Drop in the VA data

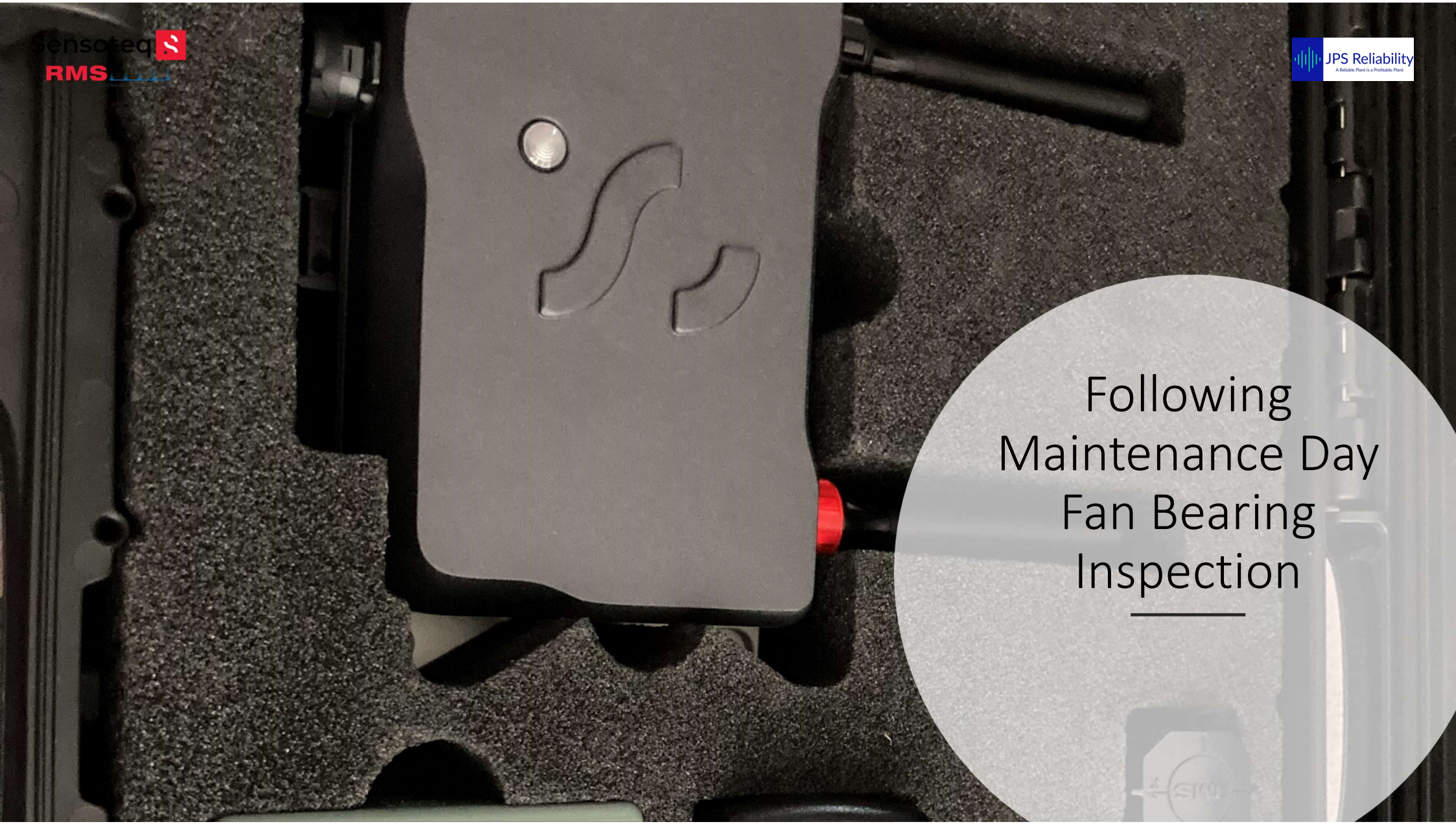
Fan NDE

53dB to 34dB on greasing – Drop in the VA data for just over 2 hours



On The Run Maintenance Data Review Summary

1. Manual temperature comparisons show that the wireless sensors have the same pattern of temperature levels.
2. The wireless system is very sensitive and can detect temperature and vibration changes on lubrication.
3. Inspection of the Fan bearings required.


Following
Maintenance Day
Fan Bearing
Inspection

Sensoteq RMS
RELIABILITY MAINTENANCE SOLUTIONS

DE Fan Bearing

Bearing overpacked with grease.

This bearing the Acceleration levels reduced but the bearing temperature increased and remained high.

NDE Fan Bearing

Bearing overpacked with grease.

With grease the levels only reduced temporary.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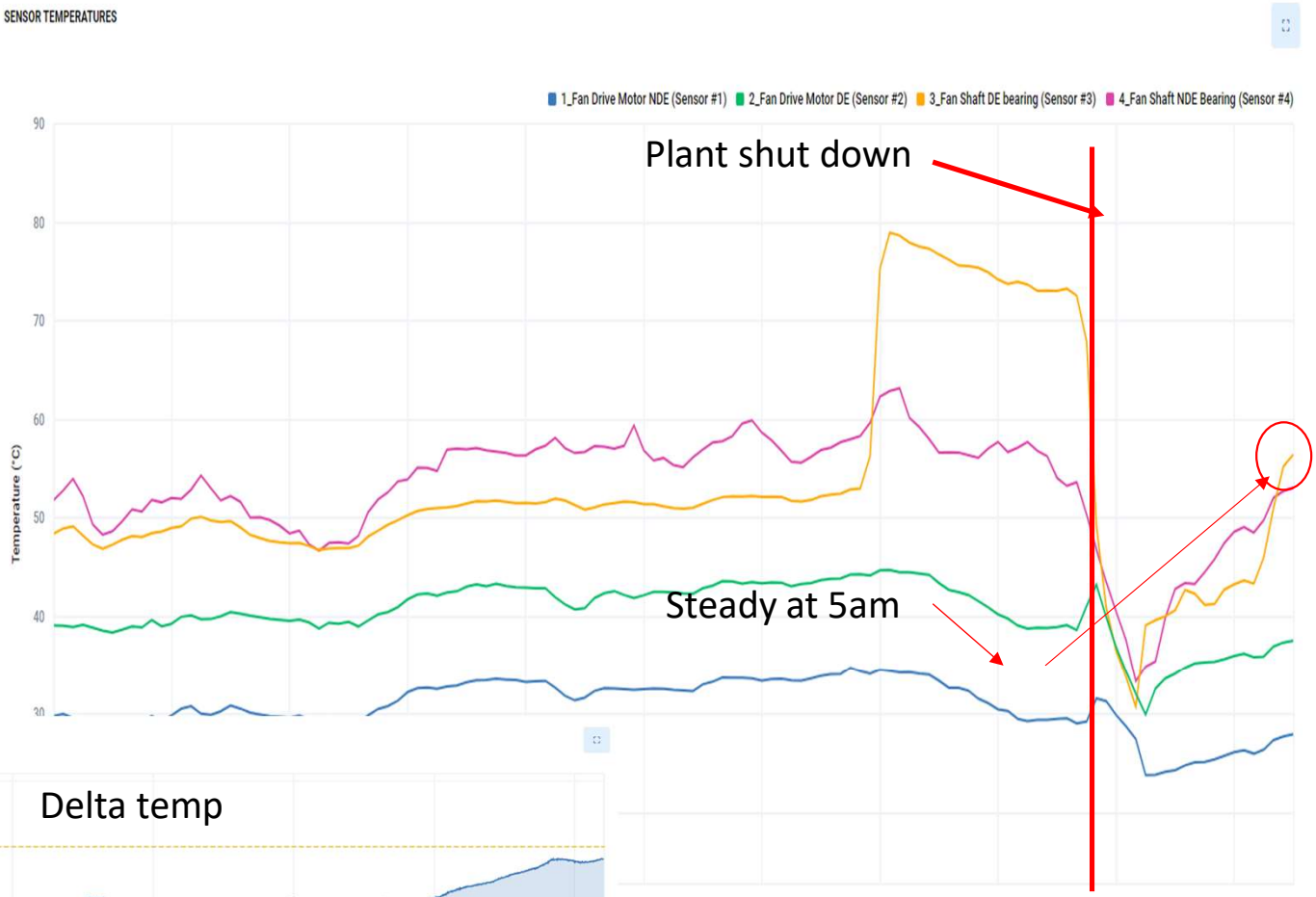
Day after bearing
full maintenance
clean and regrease

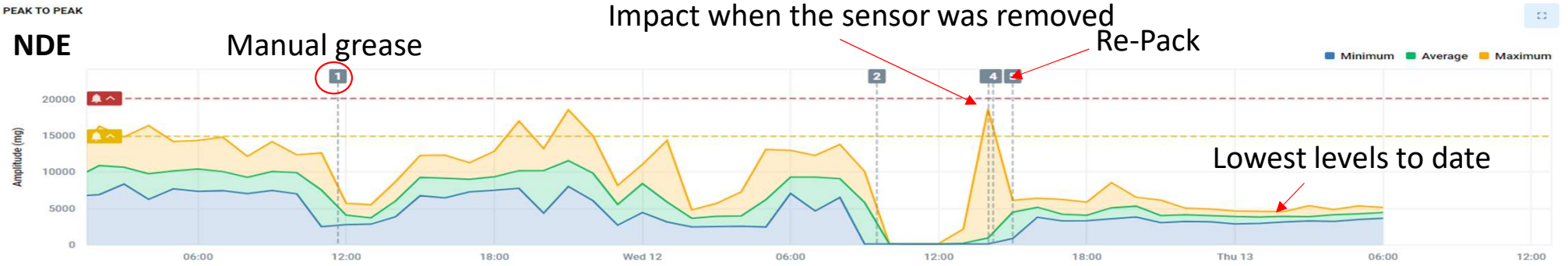
All Sensor Temperature Trends after repack

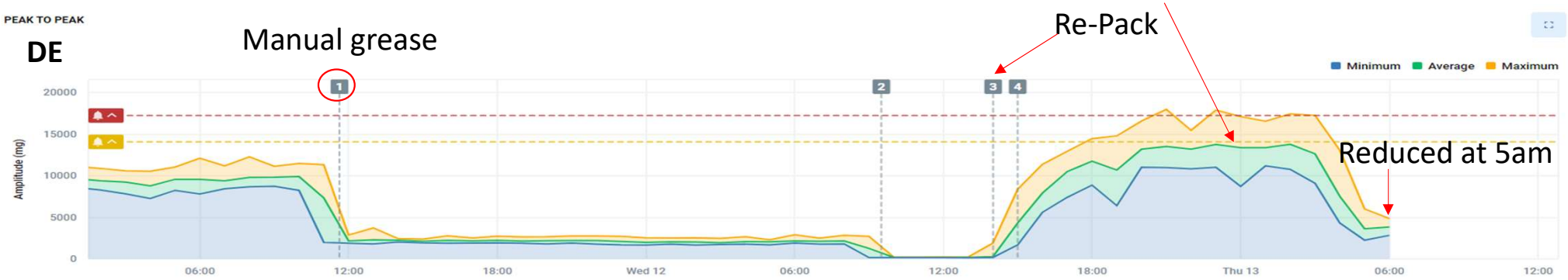
- 12 hours after start-up
- NDE temperature levels remains lower
- DE did peak and then return steady at 5am



Fan DE and NDE Comparisons

- The Fan NDE has remained at the lowest record levels
- The Fan DE had a peak increase in Acceleration and at 5am started to settled back down

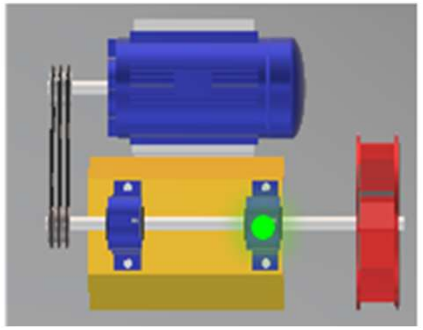




Next Maintenance actions

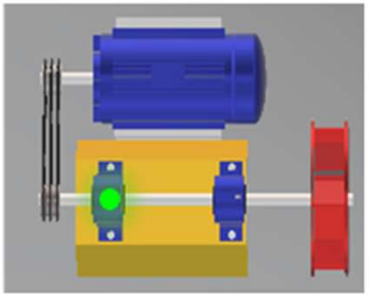
- Using the ultrasound test the fan bearings to confirm if the DE has enough grease after clean out and repack
- The fan DE bearing was greased only

12/01/22	13/01/22
11:40	13:41
34 dB's @ 22kHz	53/57dB @ 22KHz



Fan NDE

12/01/22	13/01/22	13/01/22
	Before Greasing	After Greasing
11:38	13:42	13:48
44 dB @ 22kHz	47/49Kdb @ 22KHz	35dB @ 22KHz

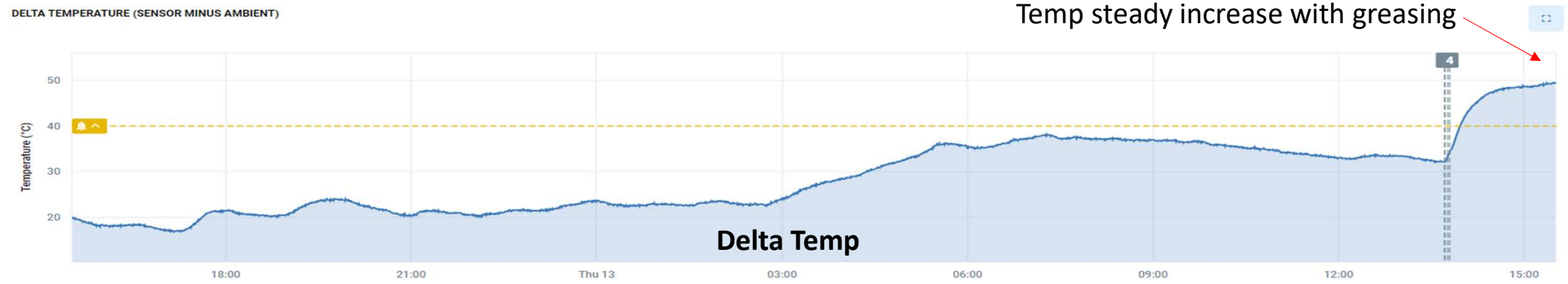


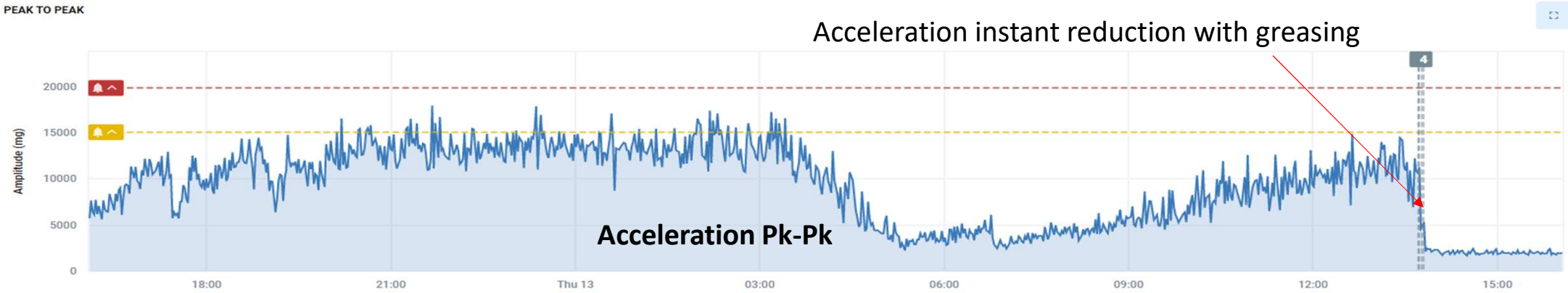
Fan DE

Performed by Matt Blacker

Fan DE Delta Temp and Vibe

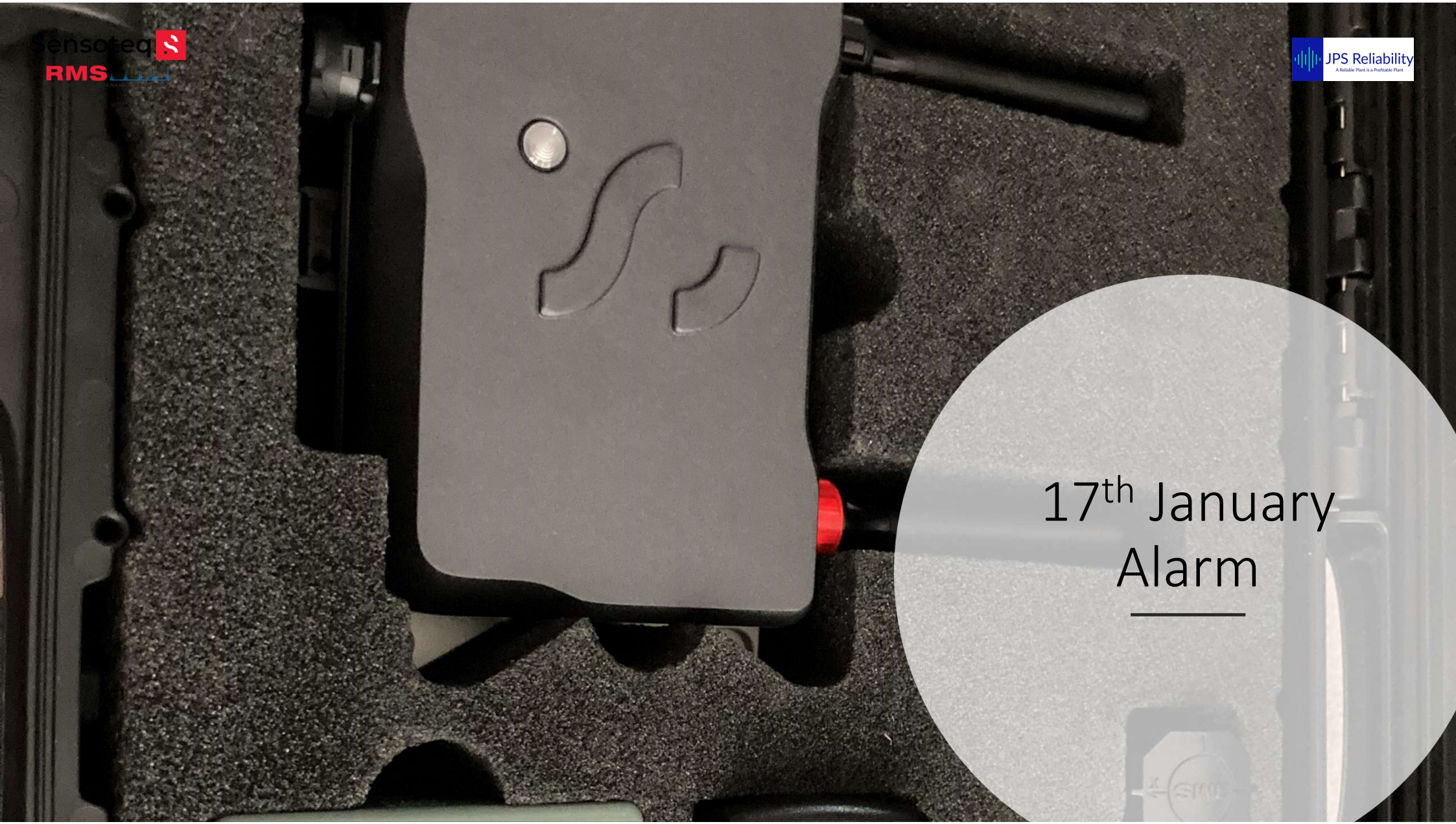
Comparisons after grease





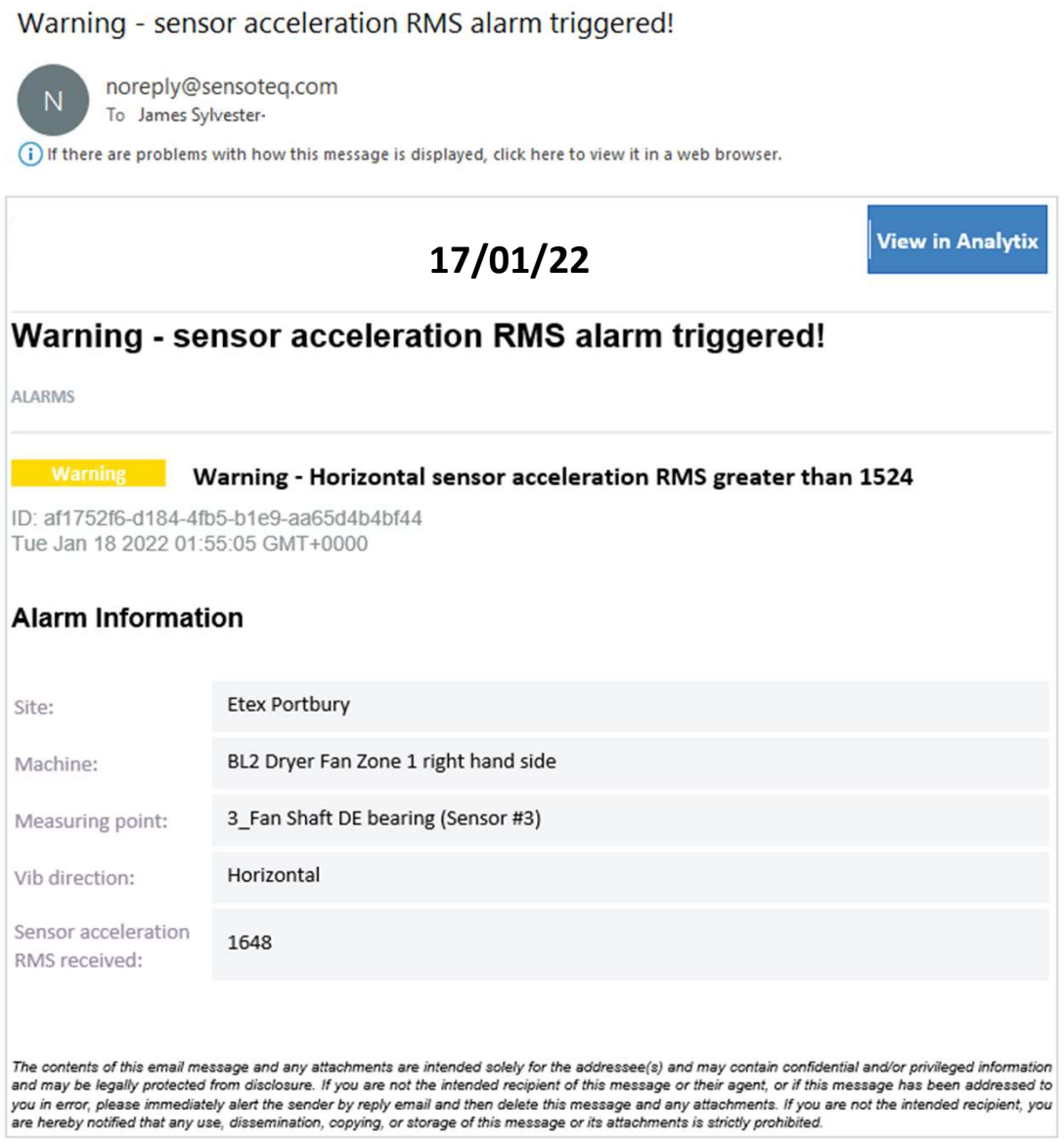
Summary of Maintenance Actions

- The first on the run greasing of the fan bearings had very little affect on the NDE, on the DE it reduced but the bearing temperature increased
- After bearing inspection it was found that both bearings were packed with old grease, this was removed
- After re-pack the NDE was at the lowest recorded levels, the DE however increased but then reduced back dow (probably as the grease was moving/settling in the bearing)
- Further controlled greasing of the DE fan bearing only


Sensoteq
RMS
JPS Reliability
A Reliable Plant is a Profitable Plant
17th January
Alarm

Fan DE warning alarm

First warming alarm 5 days since maintenance, day 10 of trial.



Warning - sensor acceleration RMS alarm triggered!

N noreply@sensoteq.com
To James Sylvester-

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17/01/22

View in Analytix

Warning - sensor acceleration RMS alarm triggered!

ALARMS

Warning **Warning - Horizontal sensor acceleration RMS greater than 1524**

ID: af1752f6-d184-4fb5-b1e9-aa65d4b4bf44
Tue Jan 18 2022 01:55:05 GMT+0000

Alarm Information

Site:	Etex Portbury
Machine:	BL2 Dryer Fan Zone 1 right hand side
Measuring point:	3_Fan Shaft DE bearing (Sensor #3)
Vib direction:	Horizontal
Sensor acceleration RMS received:	1648

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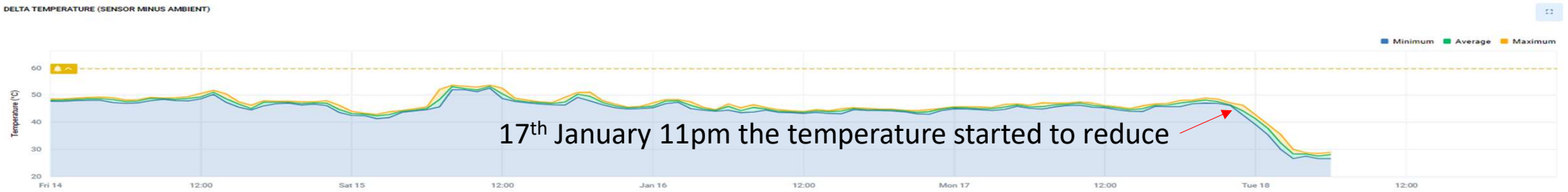
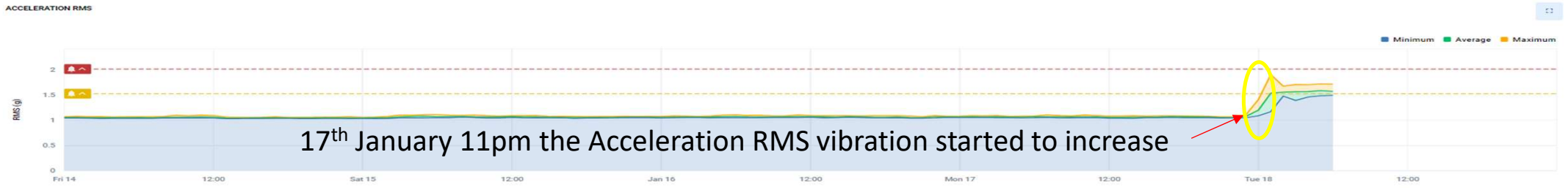
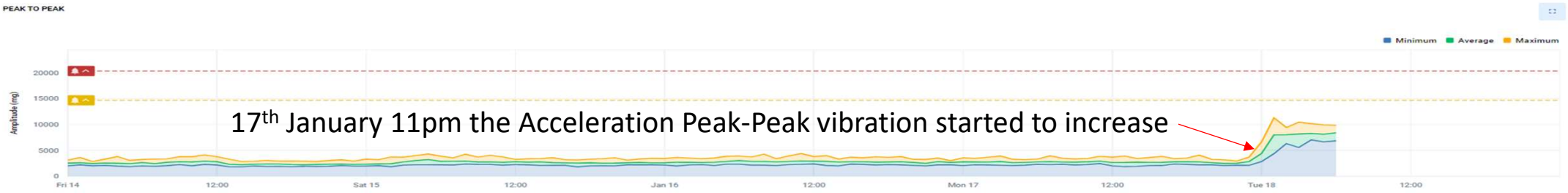
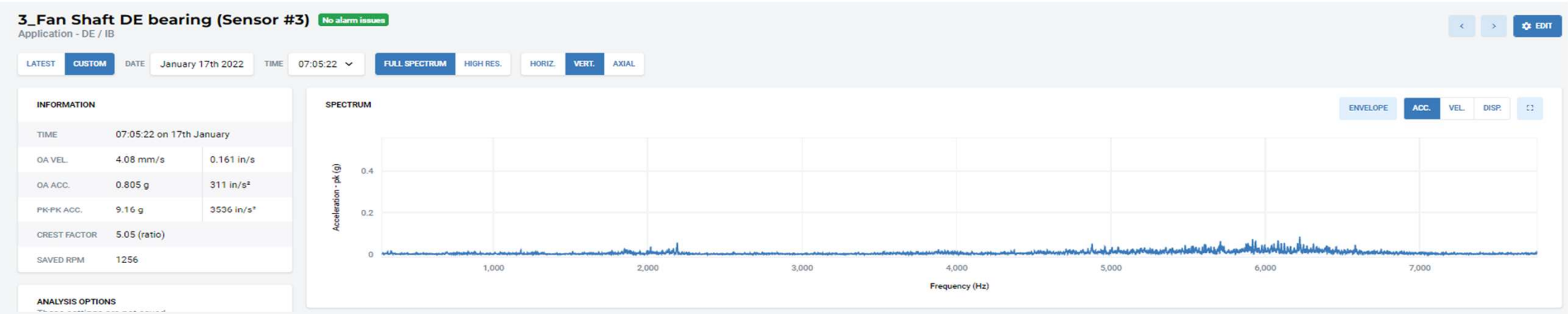
Fan DE delta Temp and Acceleration

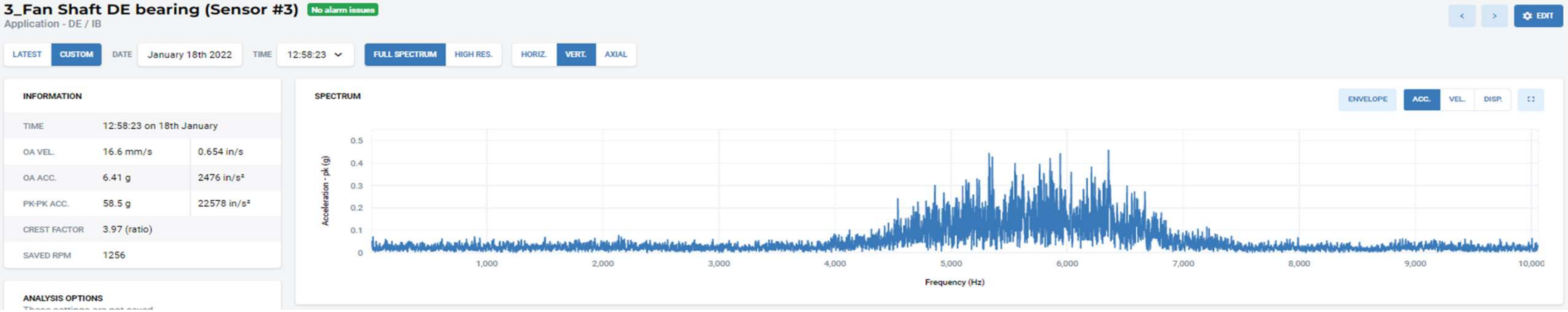






Fan DE Before and after Temp/Vibe Change



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Data Summary

Motor NDE and DE Pk-Pk Acceleration Long Time Trends

PEAK TO PEAK

NDE

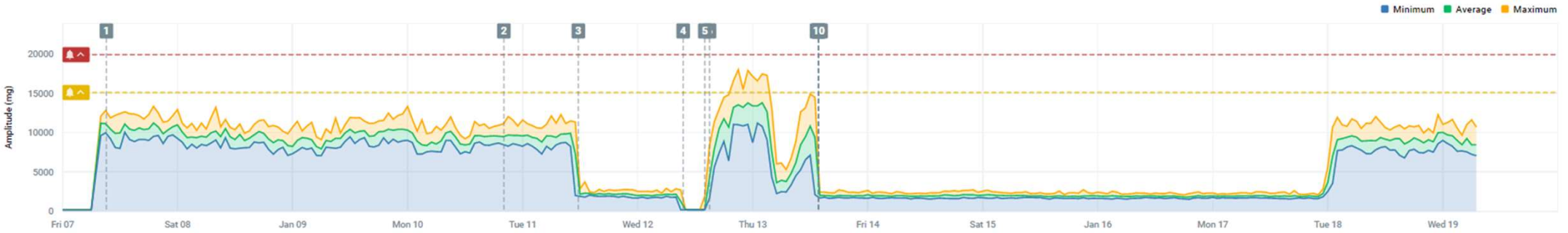
PEAK TO PEAK

DE

Fan DE and NDE Pk-Pk Acceleration Long Time Trends

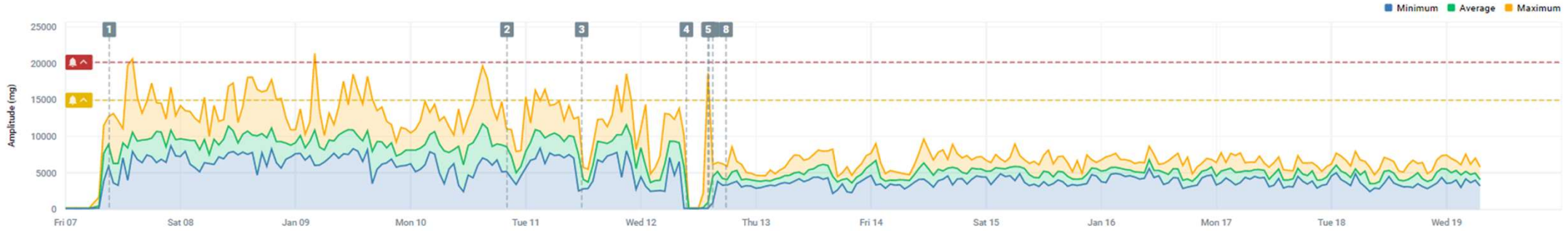
PEAK TO PEAK

DE

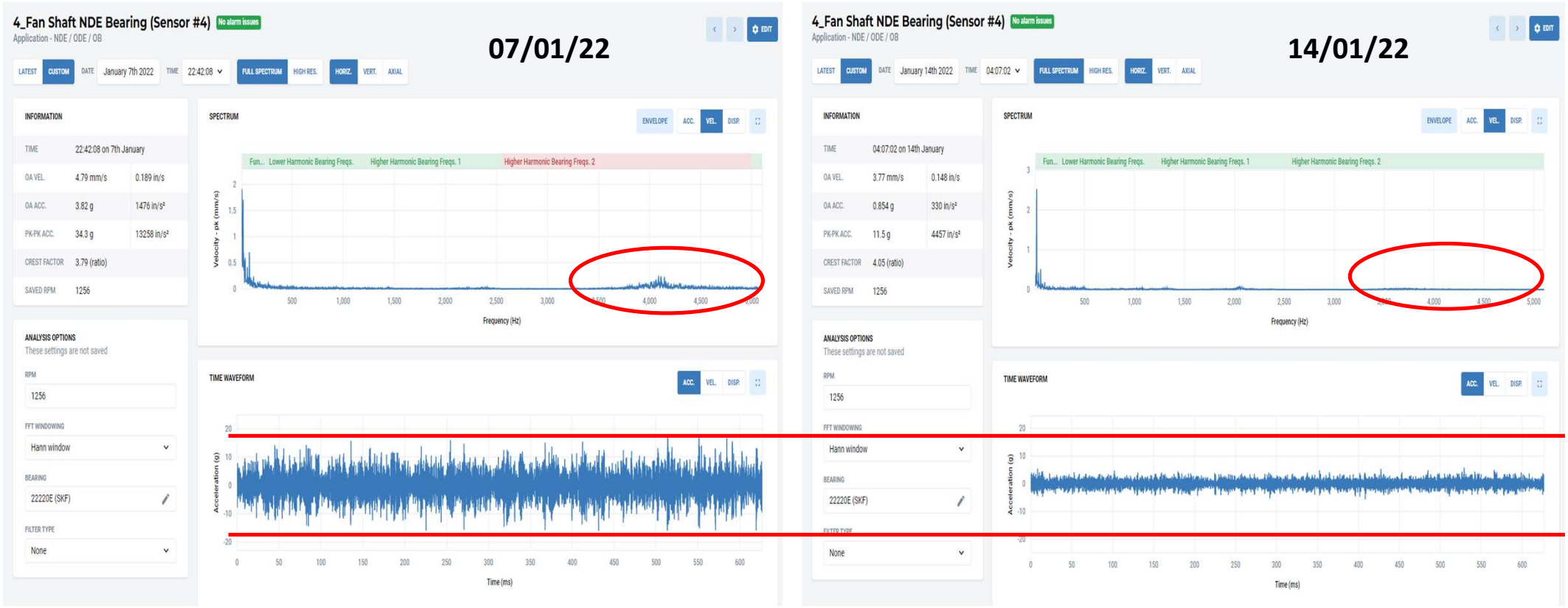


PEAK TO PEAK

NDE



Fan NDE bearing of Concern



Summary of Asset Health

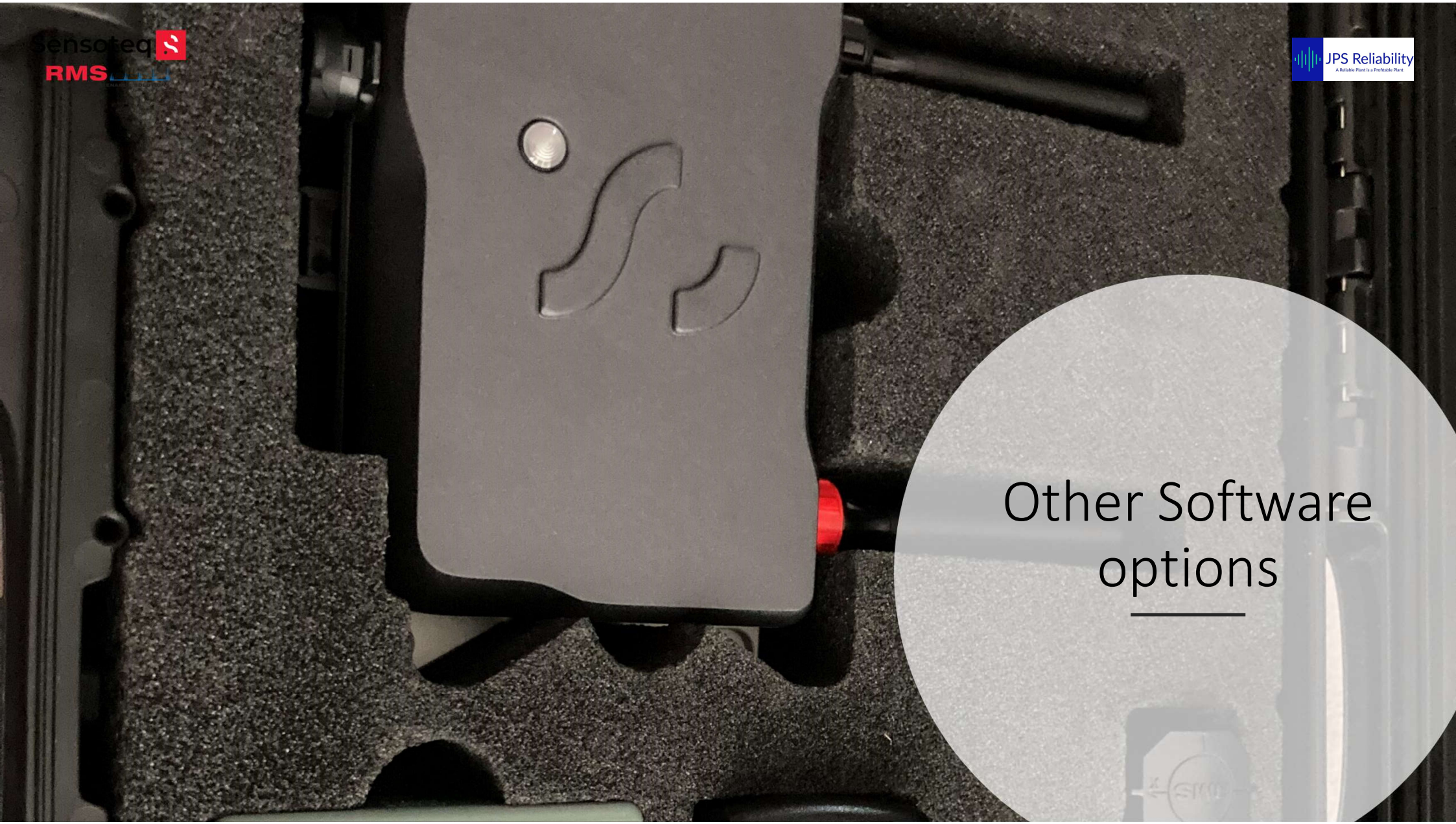
Motor: There is early outer race activity to the motor bearings, most probable due to the VFD. Action: keep to grease schedule and monitor to get the most out of the motor.

Fan: The Fan NDE bearing shows signs of general bearing wear. Corrective actions has helped to reduce the bearing stress levels.

Fan: The Fan DE bearing shows a correlation to bearing temperature and bearing health though the Acceleration levels.

Grease: We have shown how critical the right amount of grease at the correct time is so important.

Further: Given that all the six circulation fans are likely the same age it would be prudent to monitor, and risk assess the six fans for bearing health.



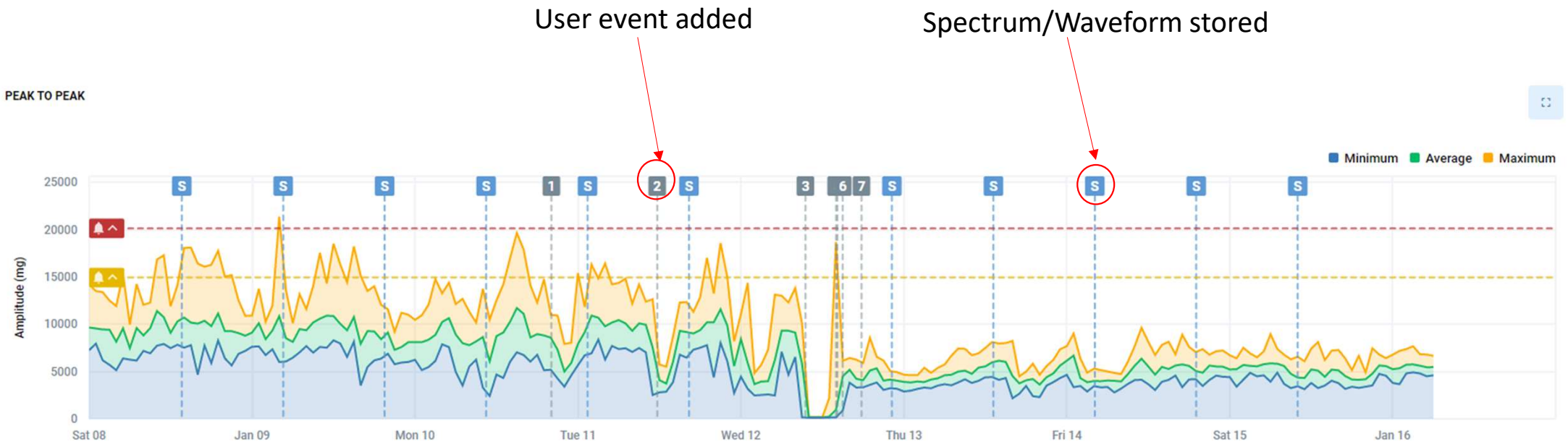
Other Software options

Alarm Score

Asset health overall metrics – Score out of 100 based on type, site, machine or measurement point.

Overall Timelines

Three critical parameters, Velocity RMS, Acceleration RMS and Acceleration Pk-Pk

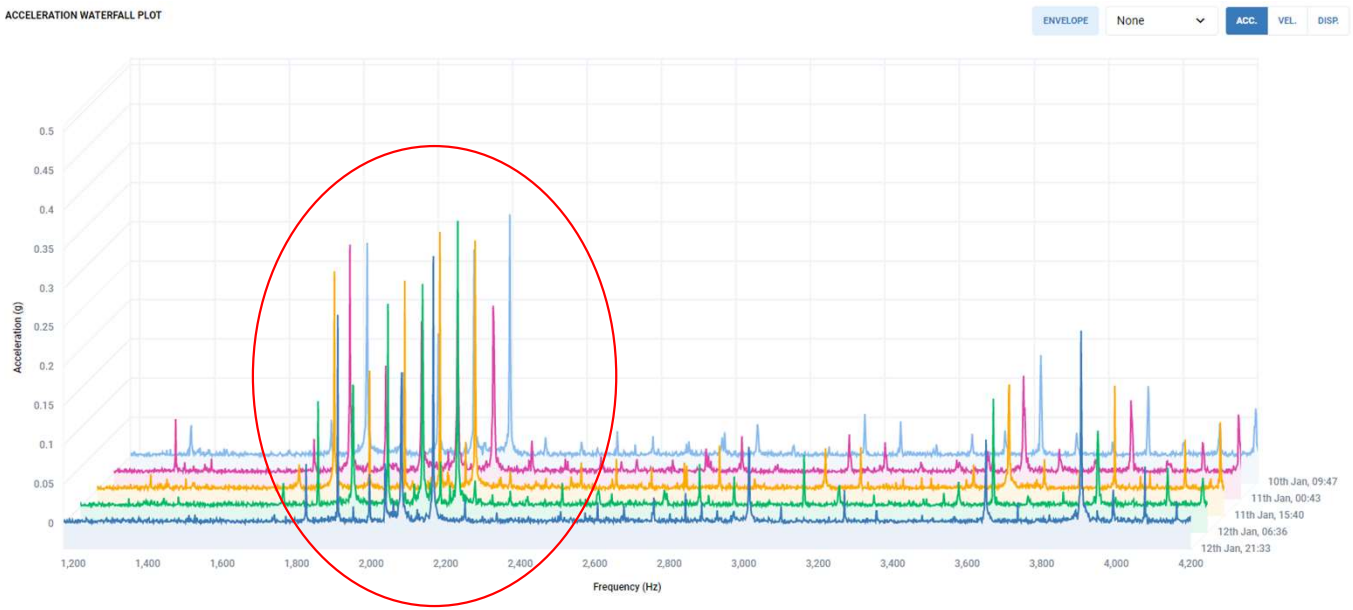


Overall Timelines

Sensor Temperature Long Time Trends

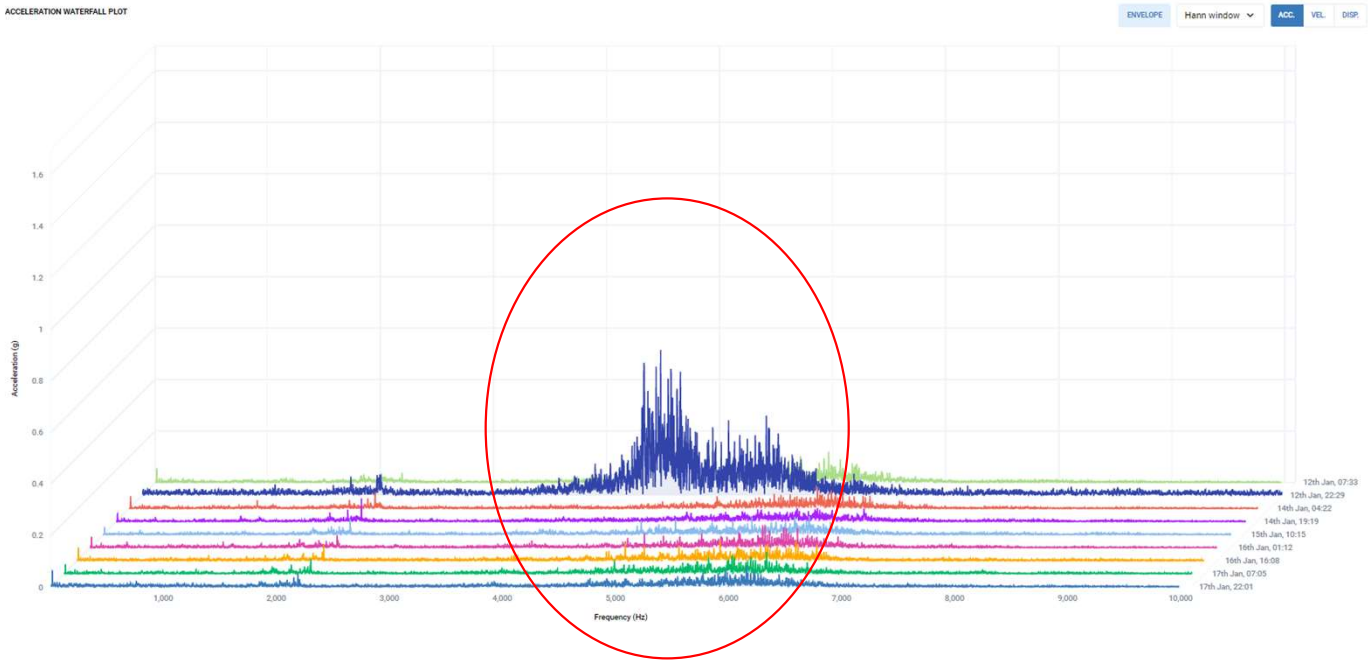
Waterfall

Here we can have a waterfall highlighting the electrical activity on the motor due to the VFD.



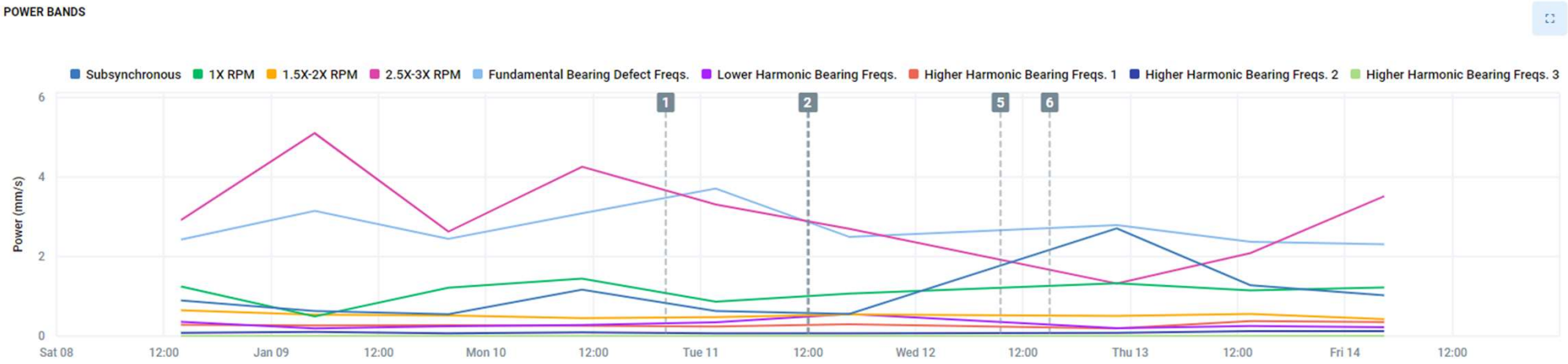
Waterfall

Here we can have a waterfall highlighting the high friction then reduction after greasing



Powerband Trends

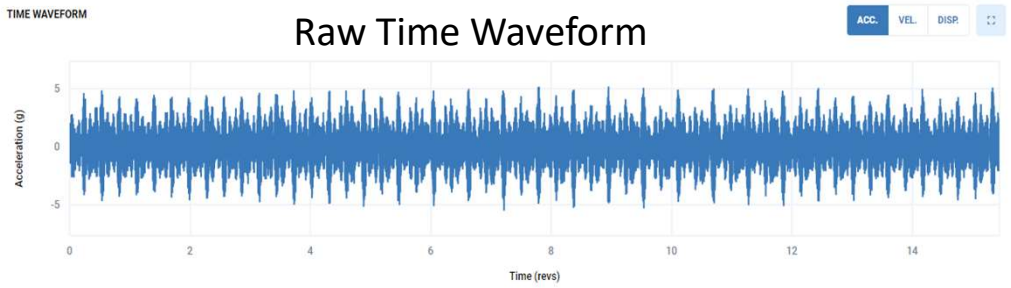
For each Spectrum Saved where there will be a powerband trend over time



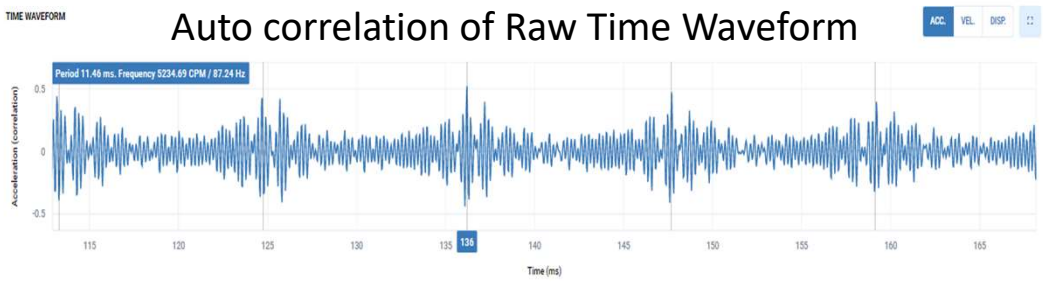
Time Waveforms

For Analysis you can have the Raw Time Waveform, Autocorrelated time waveform, Zoom in to measyre the period and also a circular plot of the data

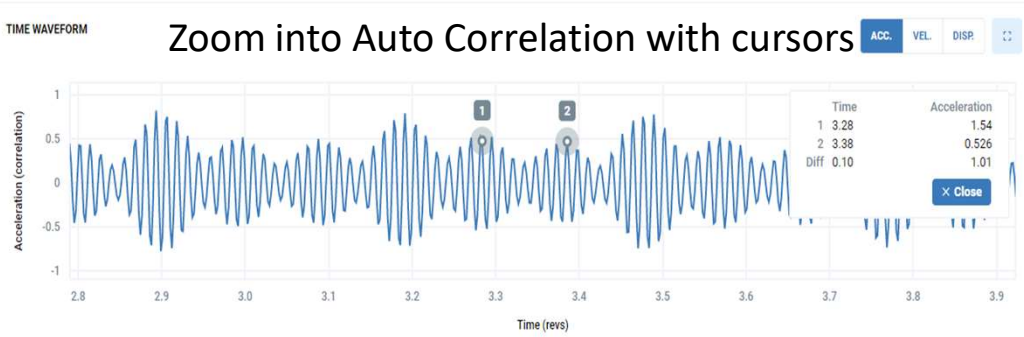
Raw Time Waveform

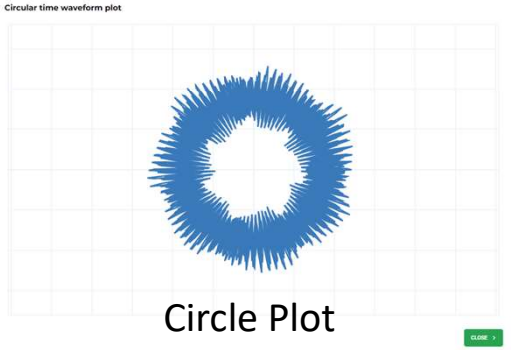


Auto correlation of Raw Time Waveform



Zoom into Auto Correlation with cursors





Circle Plot

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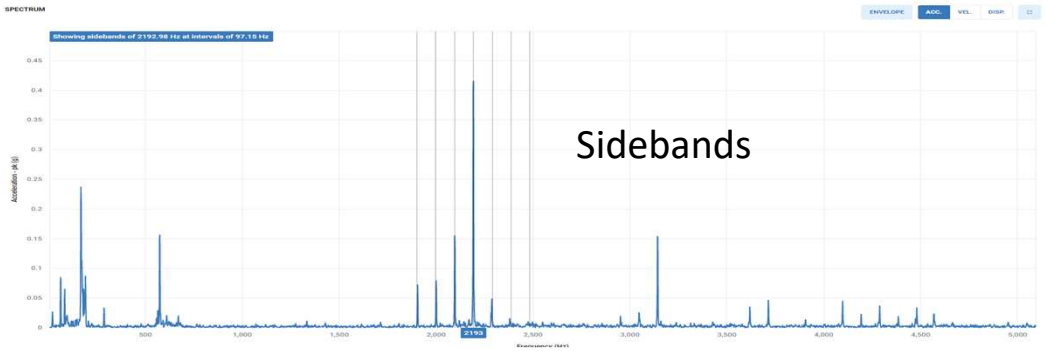
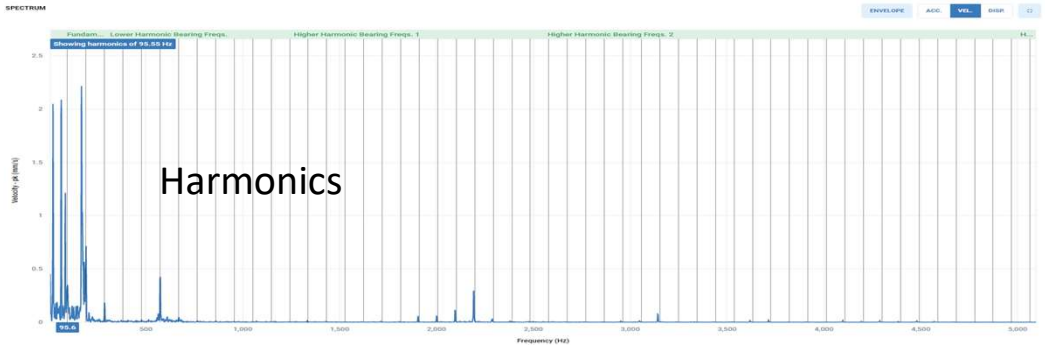
Spectrum

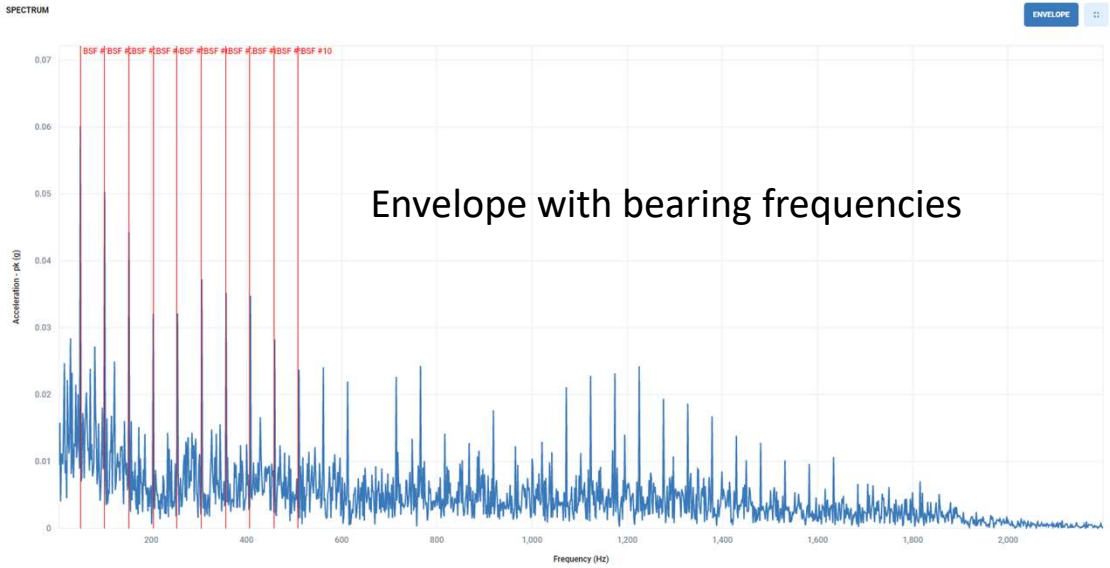
For analysis we have Acceleration, Velocity, Displacement and Envelope Spectrum choice. We can apply Harmonics, Sidebands and Bearing frequencies can be displayed.



Sidebands



Harmonics



Envelope with bearing frequencies

Analysis groups

User analysis groups can be created across various machines and points

Reports

User adjustable reports can be created

Etex Portbury - Critical issue		
Machine	**1W Alarms**	**Status**
BL2 Dryer Fan Zone 1 right hand side	9	Critical issue
Elevator 11 Head Shaft	0	OK
Left Saw Motor	0	OK
Right Saw Motor	0	OK

On inital data set up a possible defect has been detected at the fan NDE bearing.

This is the fan DE bearing Pk-Pk Trend every 3 mins showing a steady 6-7 gs

BL2 Dryer Fan Zone 1 right hand side - 3_Fan Shaft DE bearing (Sensor #3) - Peak-to-Peak

#	Name	Description	Date
1	James Sylvester	Inital Instal	Jan 7th 2022, 09:10

In comparions this is the fan NDE bearing with an elevated level of 8gs and random peaks to 20gs

BL2 Dryer Fan Zone 1 right hand side - 4_Fan Shaft NDE Bearing (Sensor #4) - Peak-to-Peak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Software comparisons

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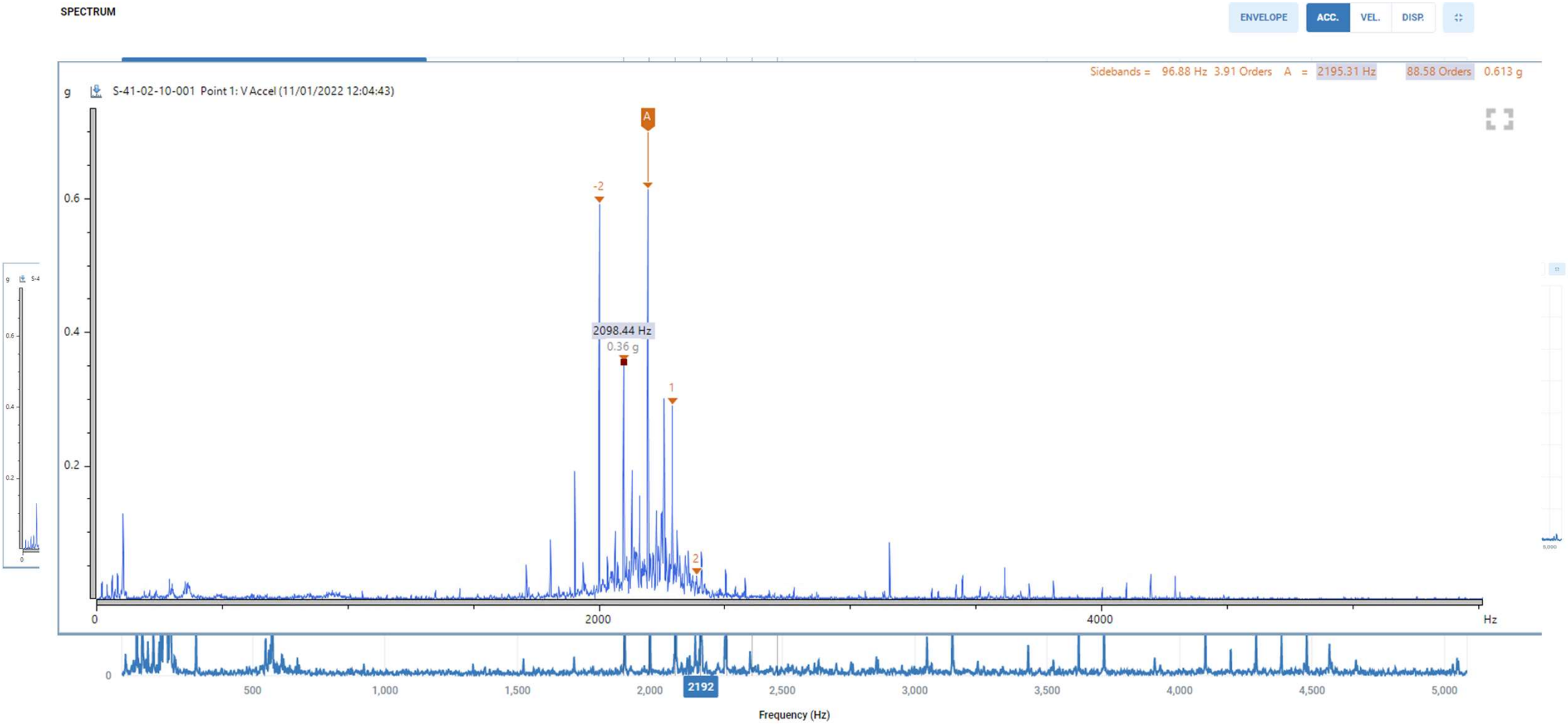
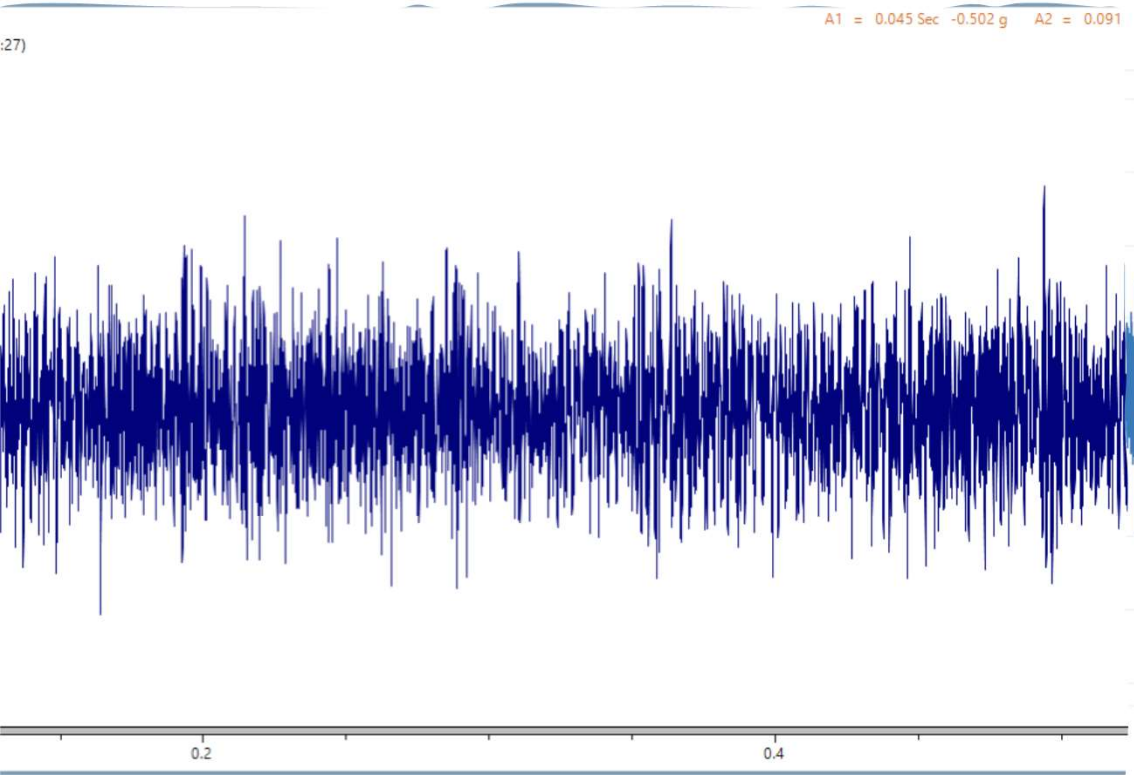
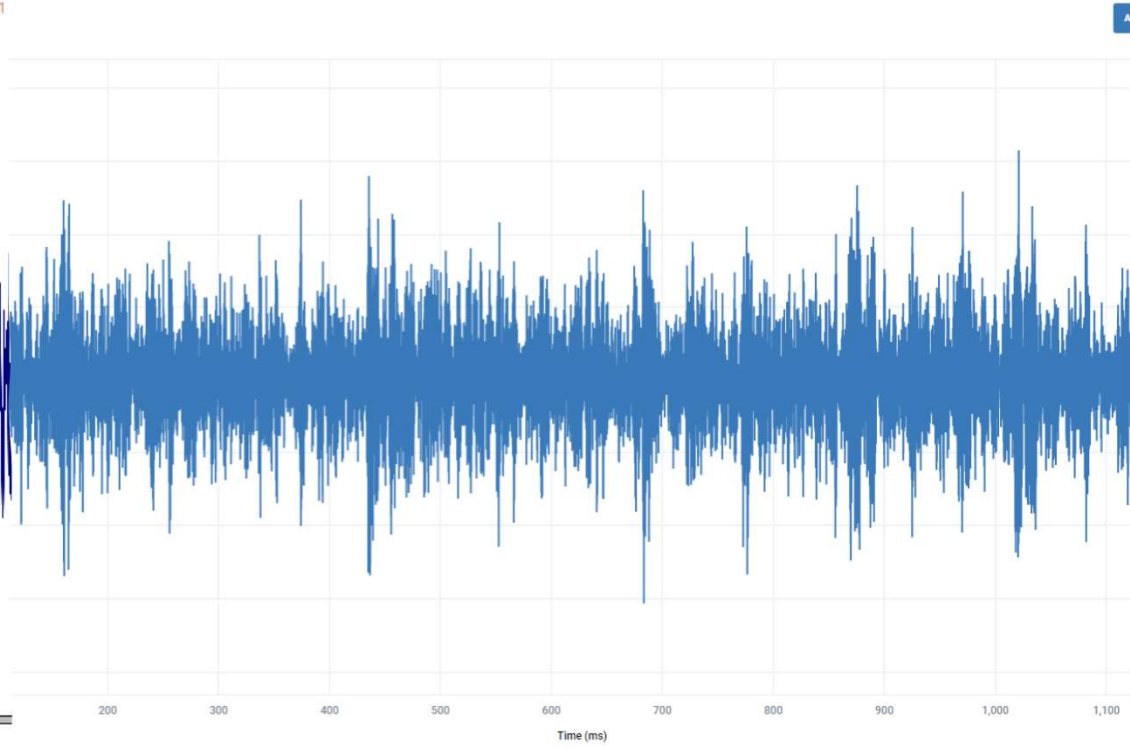
Motor NDE Data Comparison



Fan NDE Data Comparisons

Handheld 11/01/2022 11:45 Manual Vs Sensoteq 11/01/2022 16:21 Automatic

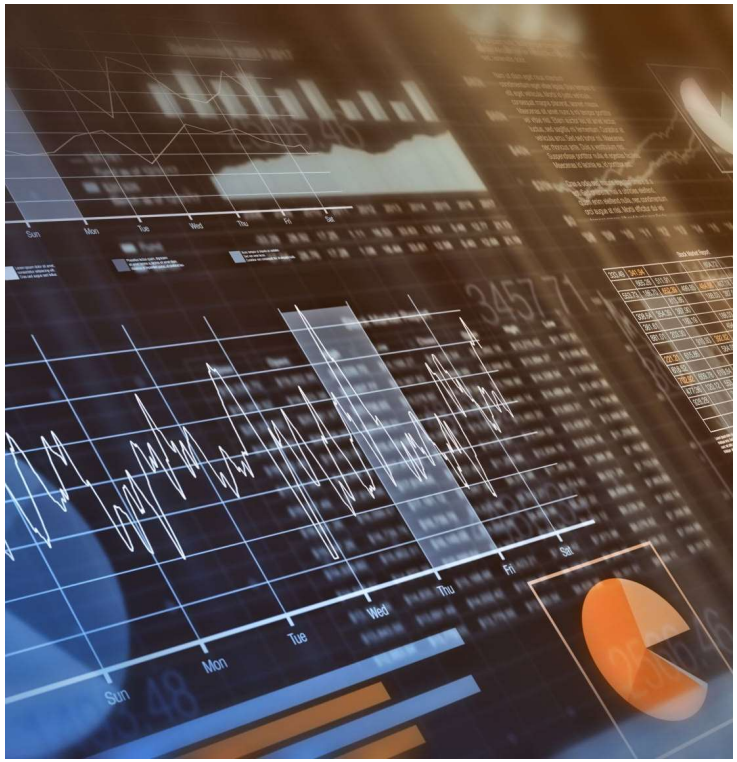




Summary of Wireless trial

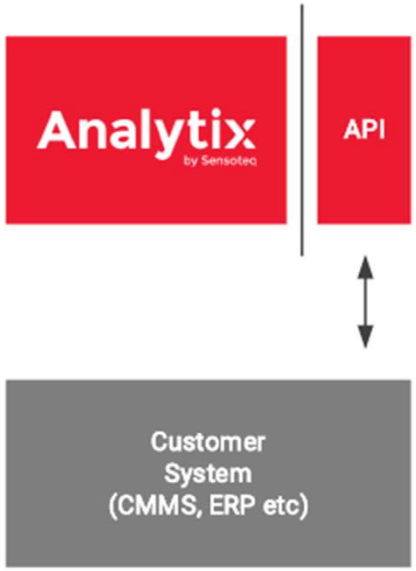
Summary - Technology

- No internal IT hassle or costs
- Moving from monthly data to 24/7 monitoring
- Automatic emails for alarms so 24/7 analytical monitoring
- Access to the data as long as you can get on the internet from anywhere at anytime
- Key vibration parameters every 1+ minutes and spectral and waveform data every day
- Temperature every 3 minutes – Ambient, sensor and delta temp
- More accurate temperature and vibration data as permanent sensors



API

- The Analytix API allows any piece of data you can see on the platform to be accessed by any program via the API calls.
- API functions will require software/IT specialist knowledge to be used in a way that is required for your application.
- The data can be pulled to other online applications to be used for alarms, creating job alerts, data collection and can even be used in AI systems.
- Sensoteq require an NDA to be signed by both parties as the API contains proprietary information. Once signed, they will send the full API documentation which contains all available endpoints.
- To request access to the API using your account or even a new dedicated API account, contact Sensoteq for a quick discussion.



API Specification	
Physical	
Architecture	RESTful
Requests	HTTPS
Format	JSON
Authentication	JWT
Key Expiration	Never
Access Control	Via standard Analytix GUI
Key Generation	Single generation
The API is fully documented, and we can provide support if necessary.	

Technical management, created and Presented by

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With support from

Sensoteq

RMS

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