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DIR-20-08-21-2021-2B Stationary shakeout

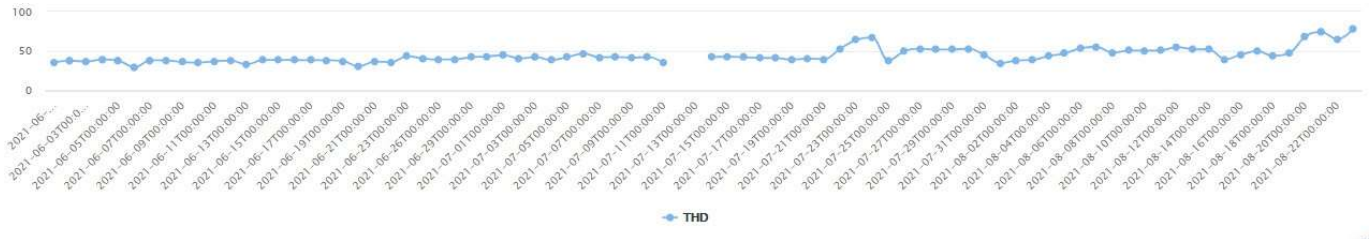
Machine Insight

Warning Indication:

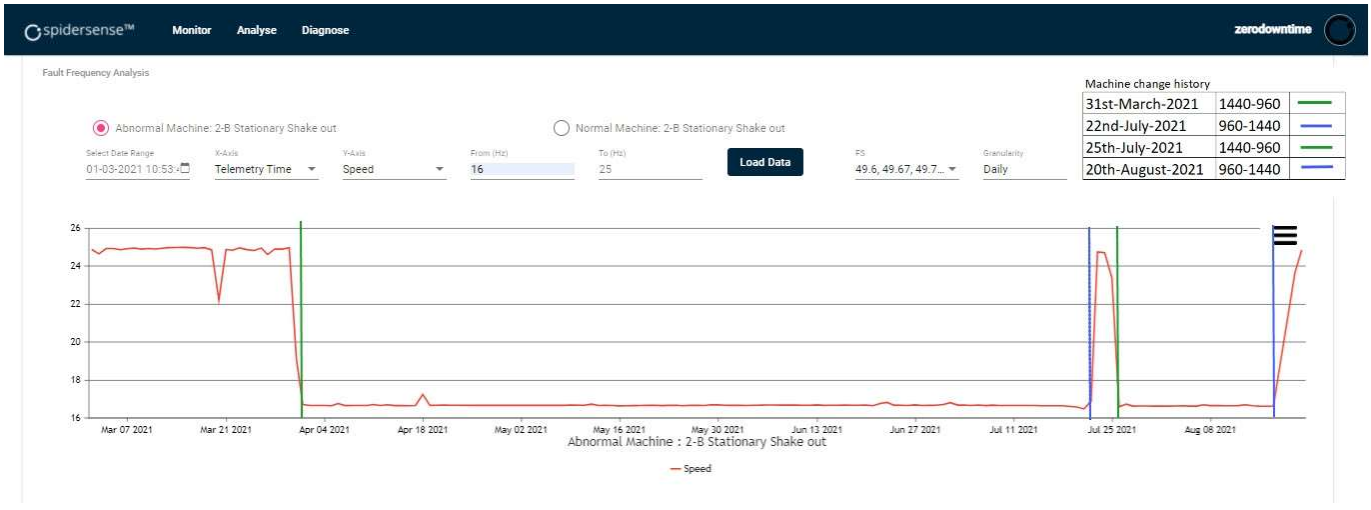
The THD of the machine is high from 1st June 2021, it has a increasing trend since then Ref(THD).

Diagnosis:

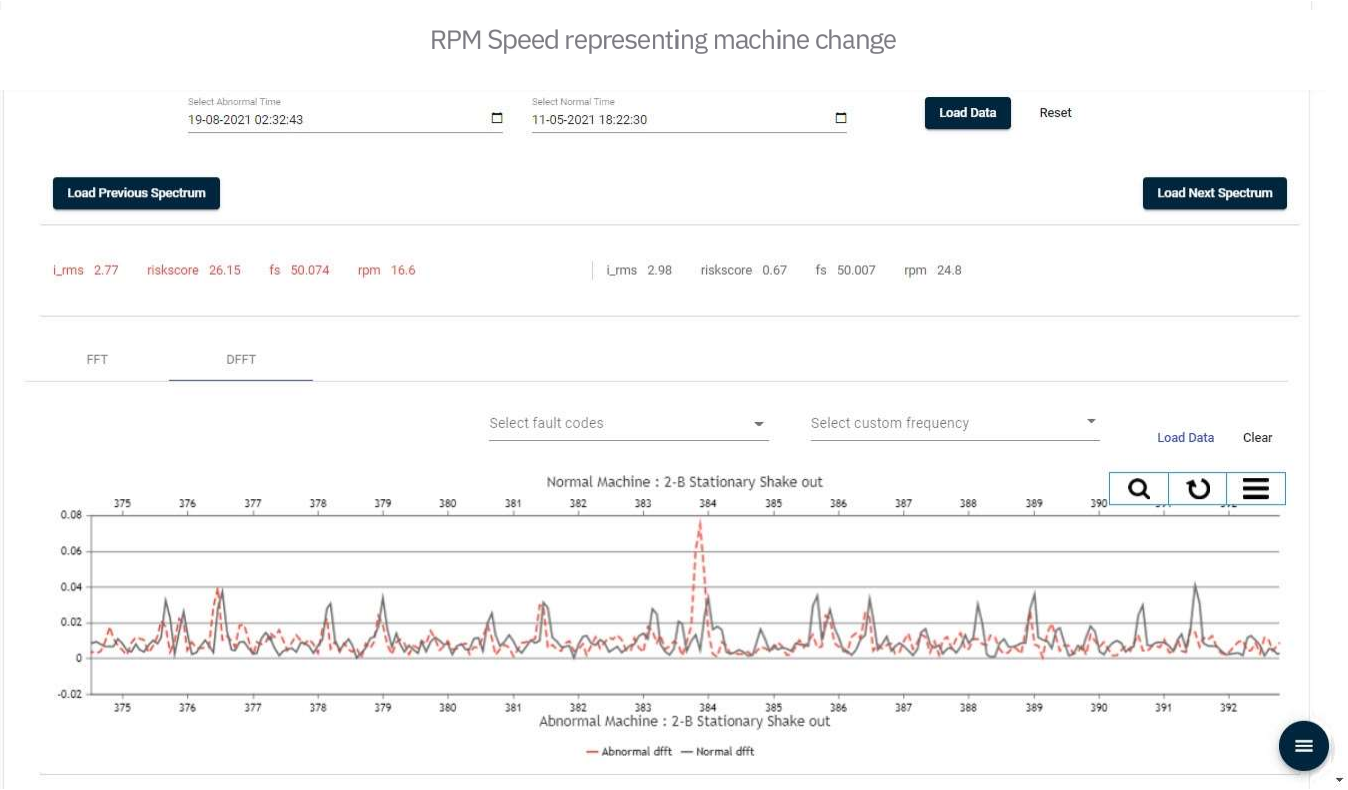
- 2-B shakeout is changed multiple times since march 2021(Ref RPM Speed representing machine change).
- 2-B shakeout has NJ 310 C4 bearing. Bearing frequencies are as follows, Ball Passing Outer Race (BPFO)=81.3008; Ball Passing Inner Race (BPFI)=118.6192; Ball Spin Frequency(BSF)=6.8306; Cage Frequency:42.8162.
- Increase of Bearing and Winding of the motor is observed. Ref(Increase in energies at 11FS-BPFI in the spectrum) Ref (Trend of energies at 11FS-BPFI frequency).



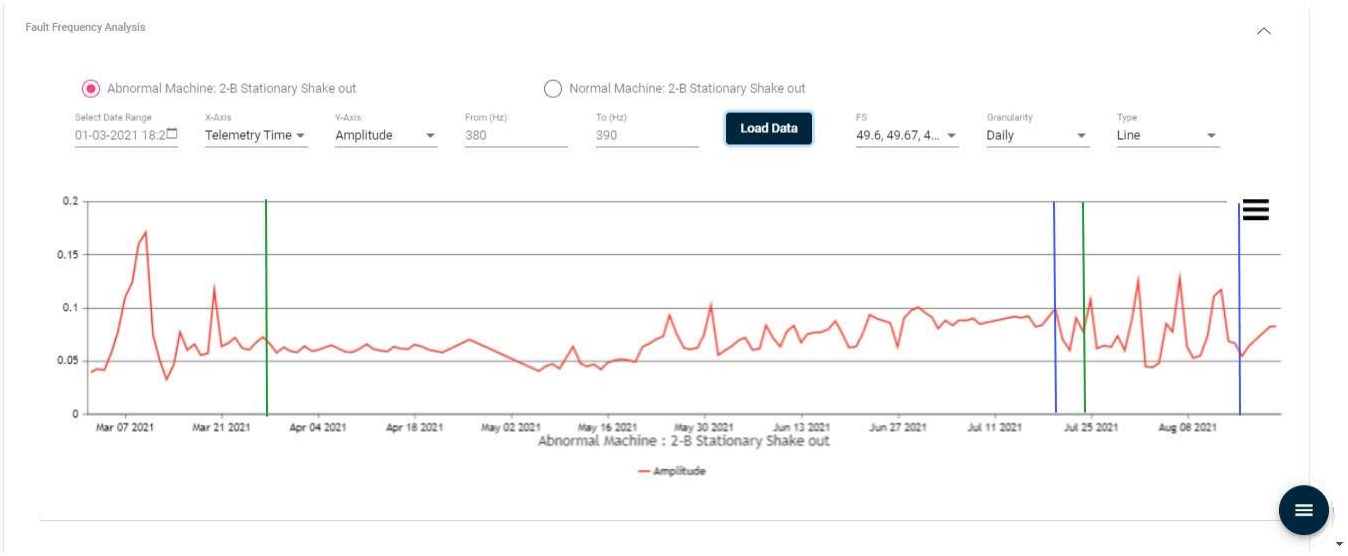
THD



RPM Speed representing machine change



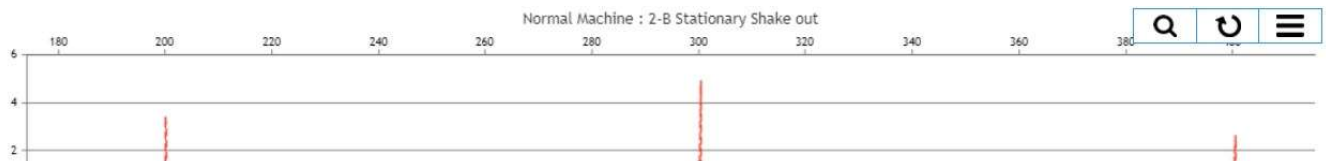
Increase in energies at 11FS-BPFI in the spectrum

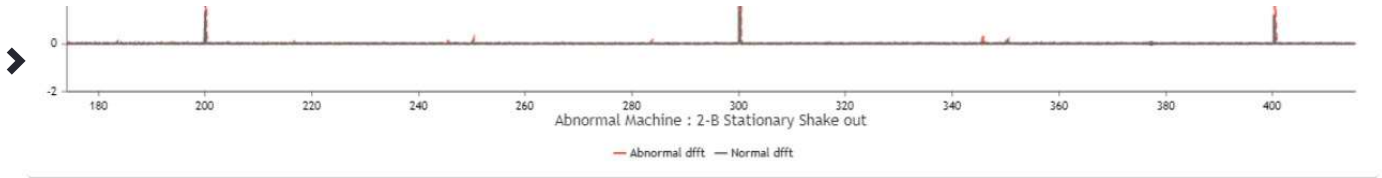


Trend of energies at 11FS-BPFI frequency

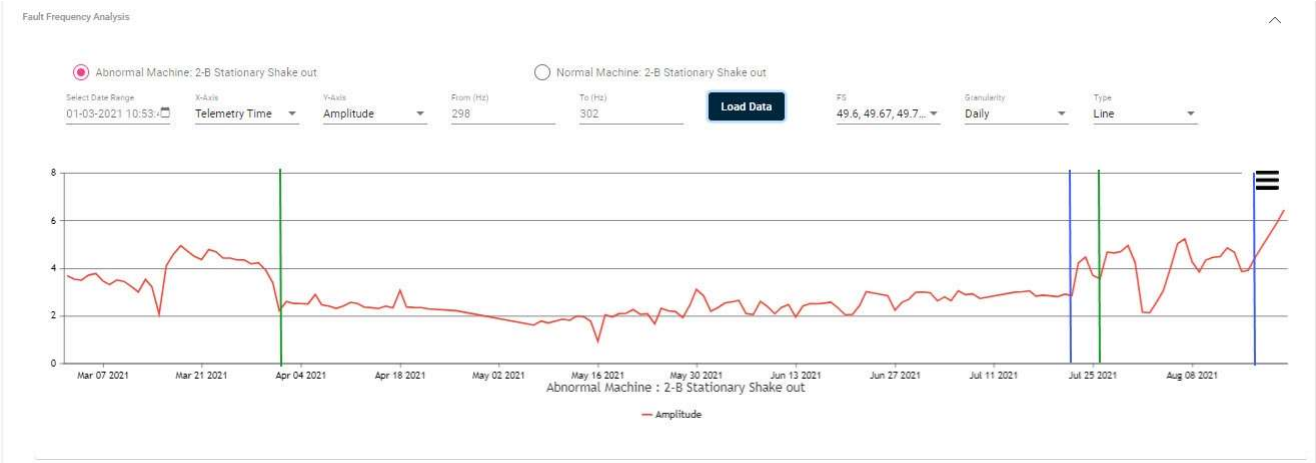
Root Cause:

Even the machine is changed the odd Harmonics are getting increased Ref(Increase in energies at harmonics in the spectrum), Ref (Trend of 5th Harmonic of Fundamental frequency). It is increasing irrespective of Machine changes. This increase is causing increase in bearing frequencies. These bearing frequencies are being modulated with these harmonics.





Increase in energies at harmonics in the spectrum



Trend of 5th Harmonic of Fundamental frequency

Effects of Increased Harmonics:

- Harmonics makes it harder to magnetize the copper and iron in motor’s stator and rotor, causing higher eddy current and hysteresis losses. These losses manifest as additional heat. Its most damaging stress the motor experiences. It degrades winding insulation, causes bearing grease to lose lubricity, and reduces motor's life. Depending on the level of harmonics present, the heat generated may cause the tripping of thermal protection systems in your motors.
- The harmonics increases Bearing currents to cause arcing between the bearing raceway and journal or balls, creating a much rougher surface, increasing your friction losses, and potentially causing the bearing to cease functioning. The arcing also accelerates breakdown of the lubricant. This causes bearings to fail sooner.
- Harmonics with high rates of change in voltage, may cause partial-discharge arcing in windings, accelerating degradation in the winding insulation.