

HYDRAULIC POWER UNIT FAILURES

The cases shown are from the following machines:

1. Worn Jaw Coupling

Manufacturer: Diemme Filtration
 Model: Filter press GHT 2500 F12

2. Worn Gear Pump

Manufacturer: Metso
 Model: Lube System Cone Crusher HP500



Worn out coupling

Beware of overall vibration values!

Don't expect a sharp increase in vibration levels. A 50% increase of regular vibration with the motor and pump in a healthy state is enough to raise the flag. A two-fold increase means something is wrong.

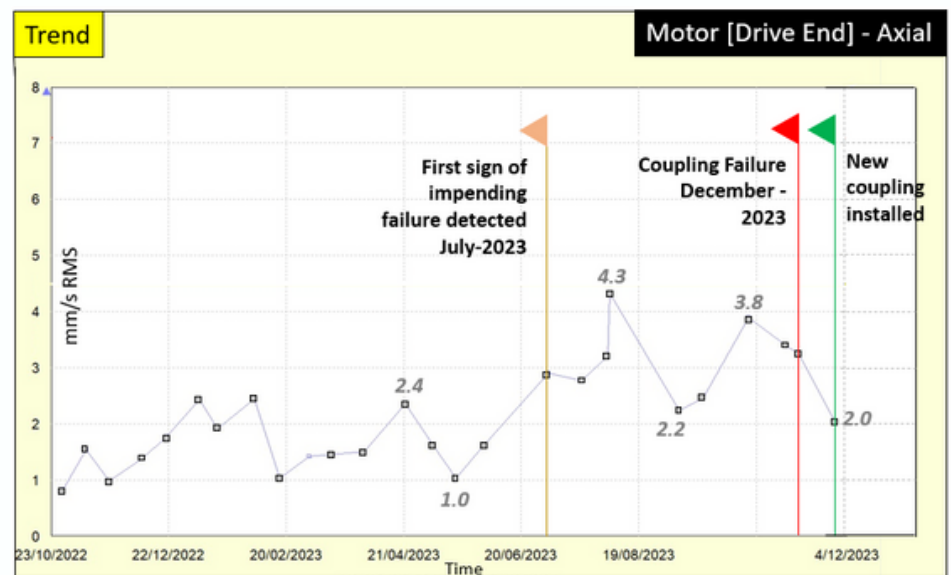
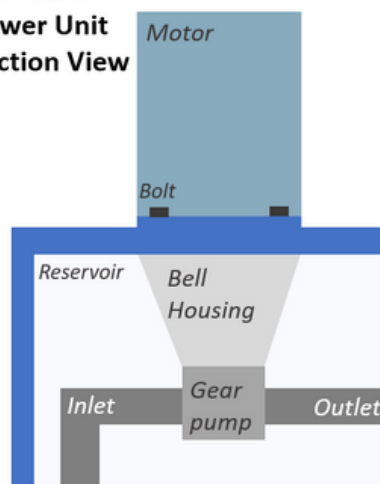


Figure 1

Figure 2



Hydraulic Power Unit Section View



Make sure to place the accelerometer at the correct location. There has to be a direct vibration transmission path to the bell housing and gear pump.

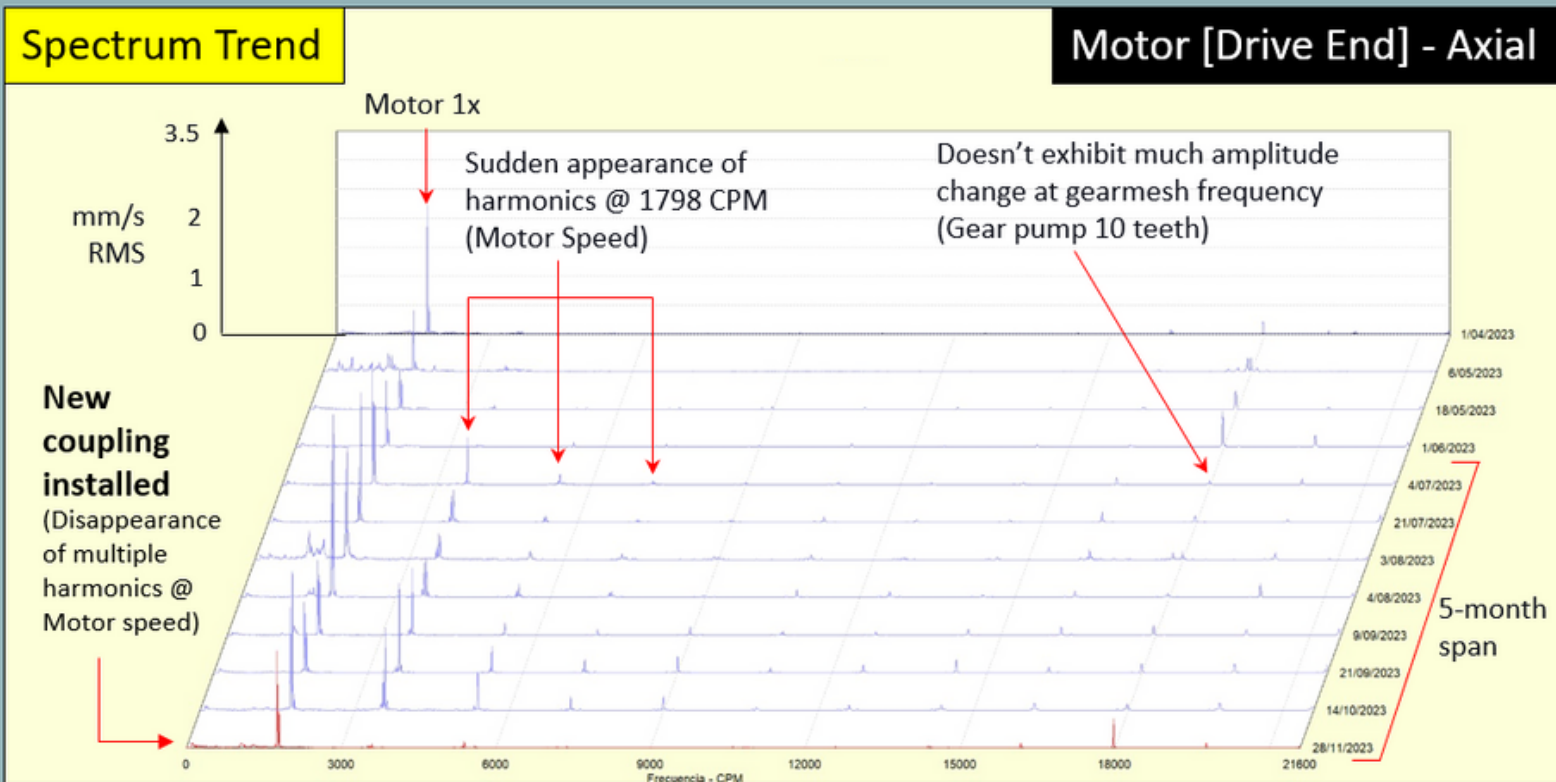
Vibration Analysis

The sudden appearance of shaft harmonics indicates looseness.

According to references, a bearing loose on its housing bore exhibits higher amplitude at 3x or 4x. A glance at the spectrum lets us rule out that option.

The coupling and gear pump are the other possible sources of looseness downstream of the motor. Since the gearmesh frequency amplitude is primarily unaffected, the vibration has to come from the coupling.

Figure 3



Repair Inspection

Figure 4

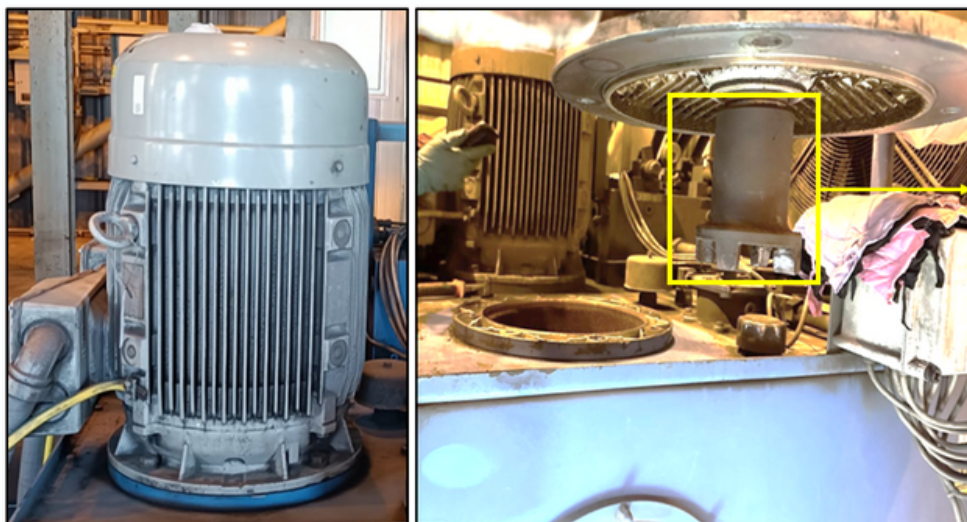


Figure 5

Worn out gear pump

The image on the right shows the motor of the lubrication system of a cone crusher.

The design is fundamentally similar to Figure 2, comprising an electric motor and a gear pump, with the latter inside the reservoir.



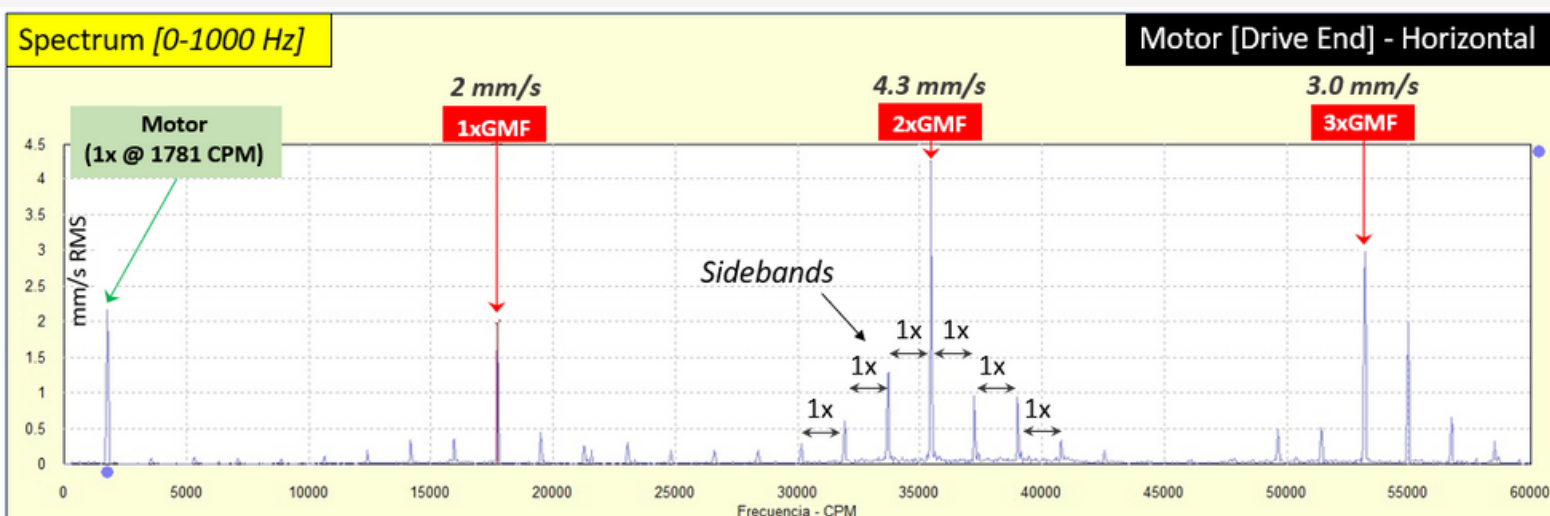
Vibration Analysis

Compared to the spectrum related to a worn-out coupling, this spectrum shows the gearmesh frequency dominant with the 2x and 3x harmonic. Moreover, there are several sidebands around GMF, which suggests a strong modulation of gear mesh.

Also note the amplitudes of GMF, which are approximately equal to or higher than the amplitude at 1x (1781 CPM)

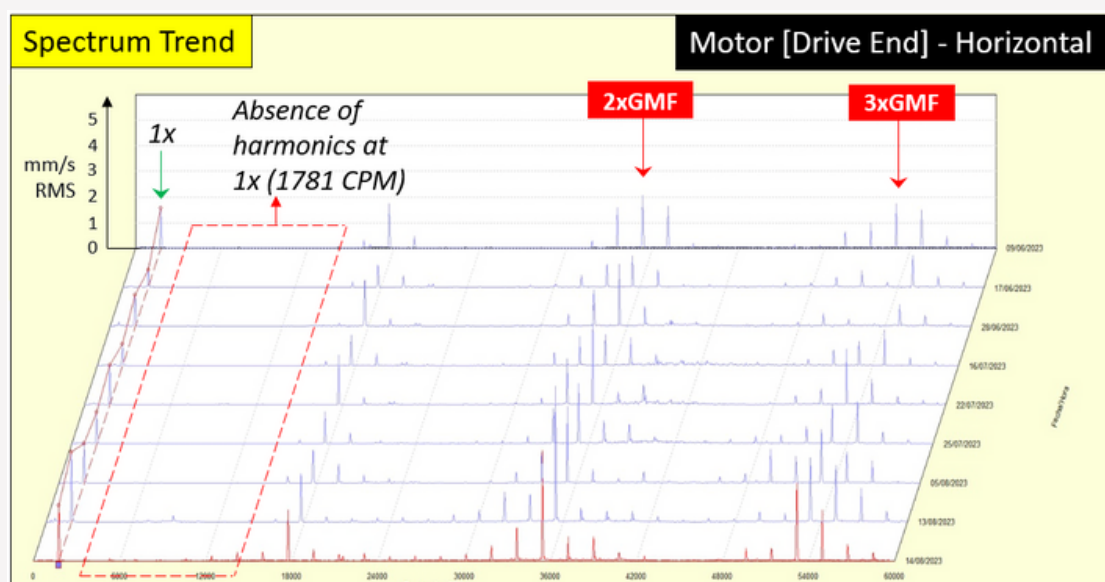
The characteristics described above point towards wear inside the gear pump.

Figure 6



Note that the spectrum doesn't show the motor shaft speed harmonics and that the amplitude reached at GMF is significantly higher than the one in Figure 3.

Figure 7



Repair Inspection

Upon inspection, the repair crew found excessive backlash due to wear. This condition was diagnosed correctly with vibration analysis.

Figure 8

