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19th July. 2012

Hoist System
Vibration Analysis Survey
1570 Dragline

Att: XXXXXXX

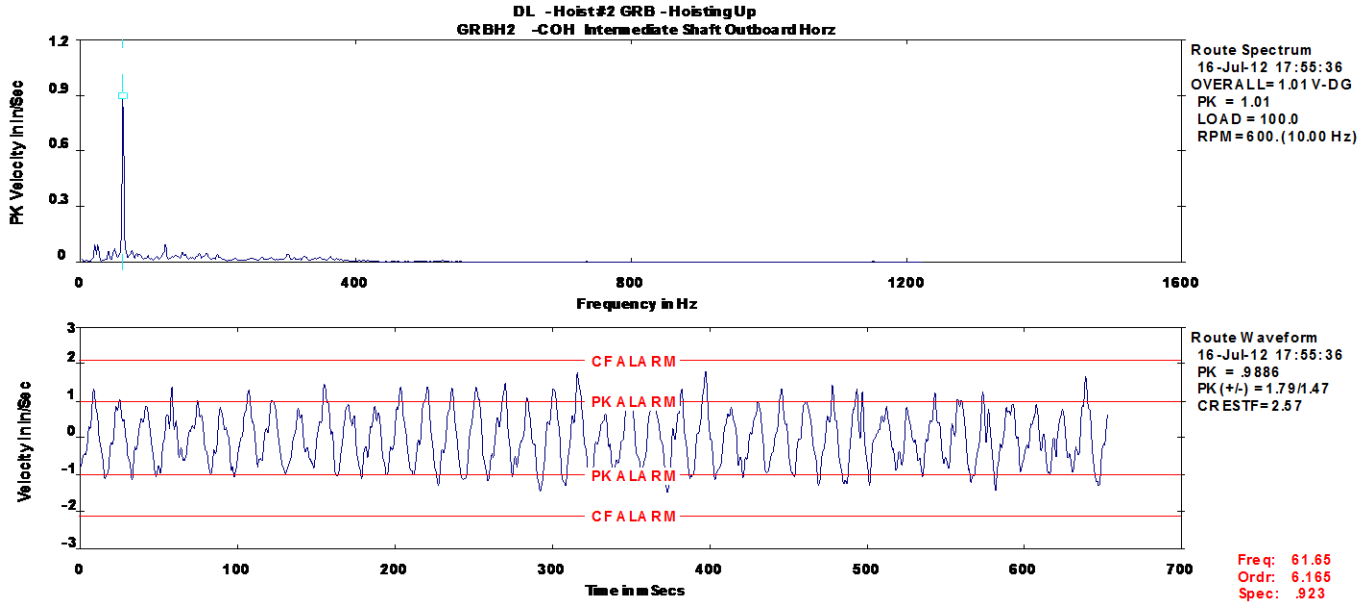
The following report is based on data collected on the 16th July. 2012:

I recorded the highest vibration amplitude on hoist right hand-side (cab side) gearbox intermediate shaft on the drum side 0.923 in/sec peak @ 61.96 Hz, the same vibration frequency is also noticeable in the same location on left hand-side but thee amplitude is only 0.461 in/sec.

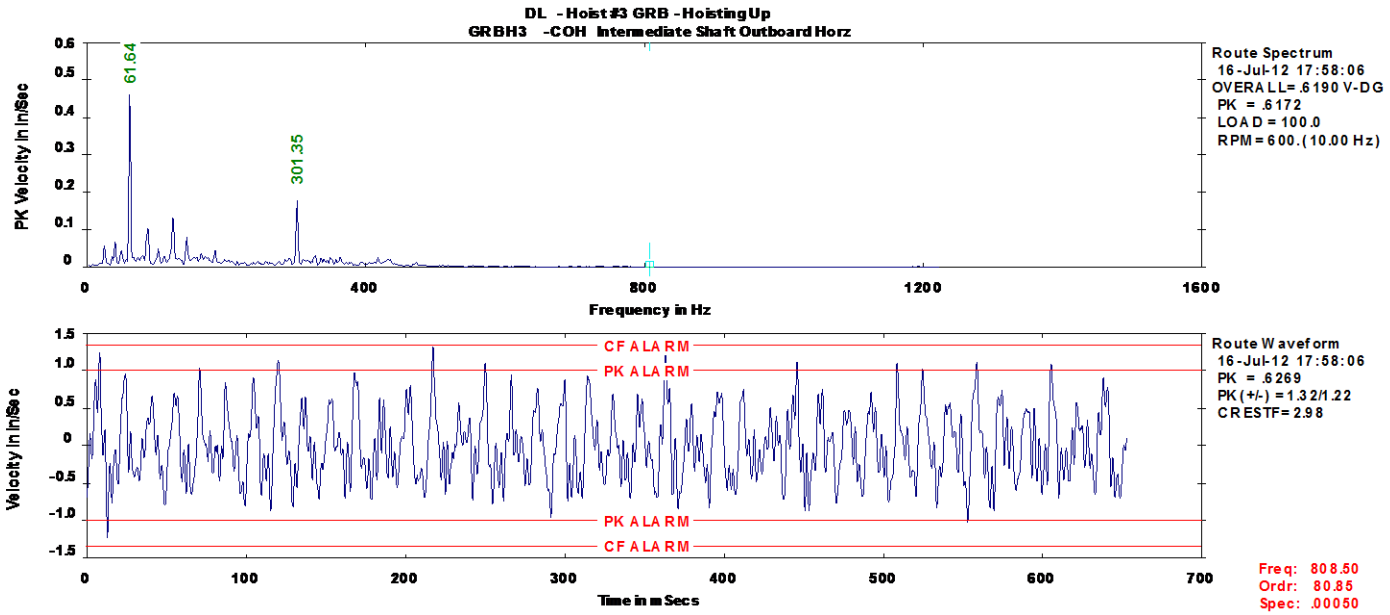
The most likely source of this vibration is the drum gear; defective gear teeth would create a vibration frequency at 61.96 Hz @ 24.78 rpm (0.413 Hz). Dependant on the rpm at the time of analysis (due to the nature of this variable speed machine it is very difficult to collect data at exactly the same speed on every run, therefore my calculations could be out by one or two hertz), the intermediate pinion would generate vibration amplitudes close to the high peak shown on the plots below.

The front input pinion on the left hand side is showing early indications of wear (peak at 301 Hz on plot #2).

Plot #1



Plot #2



1570 Dragline Hoist Gearbox Fault Frequencies'

Bearing Fault Frequency Chart

Position	Stock #	Vendor	Vendor Designation	Shaft Rpm / Hz (approx) *	BPFI Hz	BPFO Hz	BSF Hz	Fcage Hz
Motor Outboard	764058	Timken	180RU03	797 13.28Hz	7.278	4.722	2.240	0.393
Motor Inboard	764058	Timken	180RU03	797 13.28 Hz	7.278	4.722	2.240	0.393
Input Shaft Inboard	764058	Timken	180RU03	797 13.28 Hz	**7.278**	4.722	2.240	0.393
Input Shaft Outboard	764058	Timken	180RU03	797 13.28 Hz	7.278	4.722	2.240	0.393
Intermediate Shaft Inboard (Gear Side)	764364	Timken	260RU92	130 2.16 Hz	8.788	6.212	2.872	0.414
Intermediate Shaft Outboard (Pinion Side)	764059	Timken	300RU92	130 2.16 Hz	9.361	6.639	2.854	0.415
Drum Bearing Cab Side	764443	Timken	23292YMB	24 / 0.4 Hz				
Drum Bearing Opp' Cab Side	764443	Timken	23292YMB	24 / 0.4 Hz				

***Rpm varies slightly during each hoisting sequence.**

BPFI – Roller/Ball Pass Frequency Inner Race
BPFO - Roller/Ball Pass Frequency Outer Race
BSF – Roller/Ball Spin Frequency
Fcage – Fundamental Cage Frequency (Inner Race Rotation)

Gear Tooth Count & Impacts per second

Input Pinion = 23 (797rpm / 13.28 Hz) **305.5 IPS**
Intermediate Gear = 132T (130 rpm / 2.16 Hz) **285 IPS**
Intermediate Pinion = 27T (130 / 2.16 Hz) **58 IPS**
Drum Gear = 150T (24 rpm /0.4 Hz) **60 IPS**

I trust that the above is in line with your requirements but if you have any further questions please do not hesitate to contact me.

Regards: Rob Brentnall.