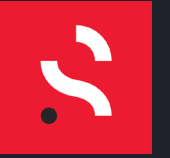




RMS 
RELIABILITY MAINTENANCE SOLUTIONS



Case Study – Wireless – Kappa X Seal Pump Problem

Petrochemical Plant

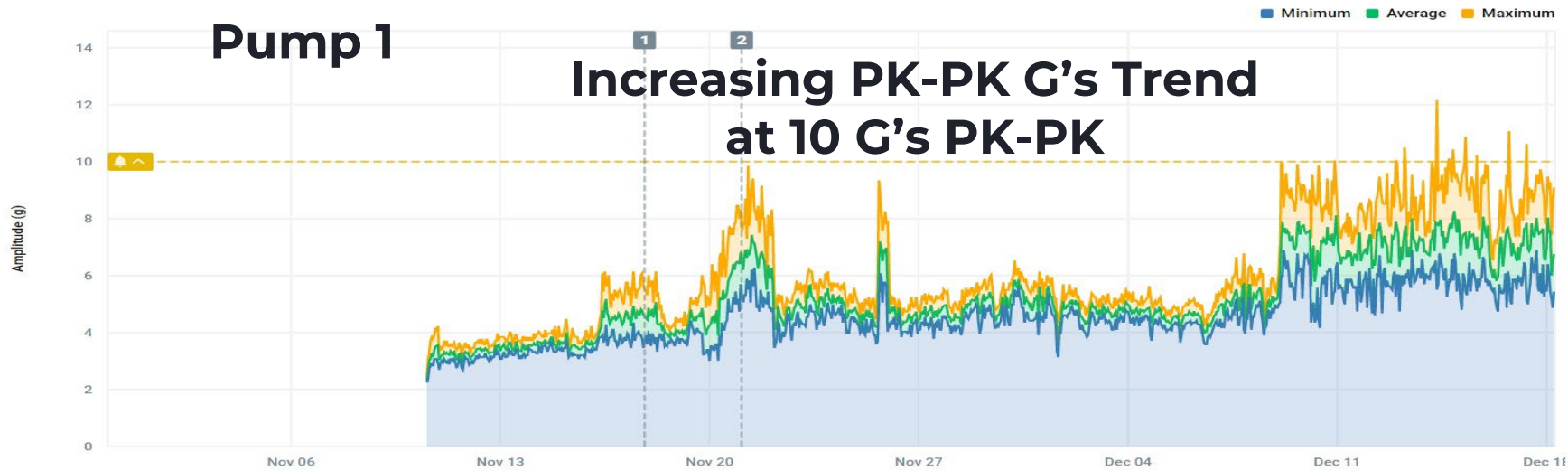


Background

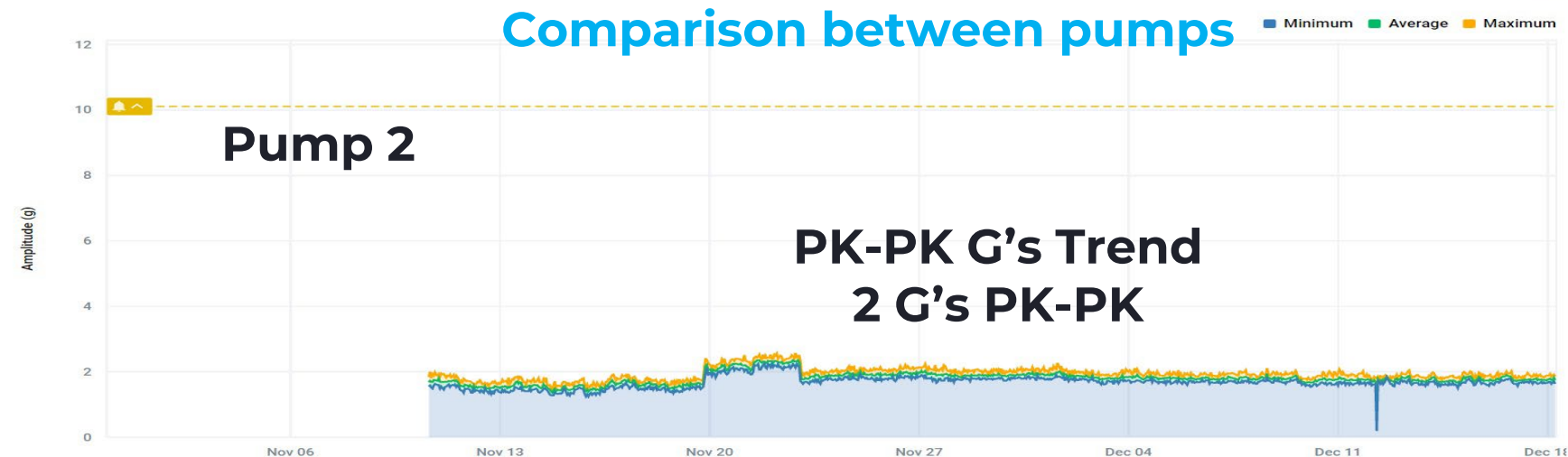
- Critical Seal Flush Pump for larger Acid Circulation Pump in Atex Zoned Area
- 4 kW gear pump 1480 RPM
- 12 teeth on pump gears
- Kappa X wireless sensor fitted to motor
- Short term tri axial readings every 3 mins
Spectrum / Waveform every 24 hours
- New pump was fitted 1 month before wireless kit installed. Historic problems with these pumps due to shaft failures closer monitoring required.

Gear Pump – Vibration Comparison Trends – 1 month

PEAK TO PEAK



PEAK TO PEAK



Analysis

- High G levels on Pump 1 vs Pump 2
- Increasing trend over a month, levels up to 10-15G's PK-PK
- Motor temp steady

Gear Pump – Wireless Spectral & Waveform Data

INFORMATION

TIME	04:21:13 on 30th November	
OA VEL.	4.54 mm/s	0.179 in/s
OA ACC.	2.35 g	907 in/s ²
PK-PK ACC.	14.7 g	5679 in/s ²
CREST FACTOR	2.84 (ratio)	
MAX RPM	1480	

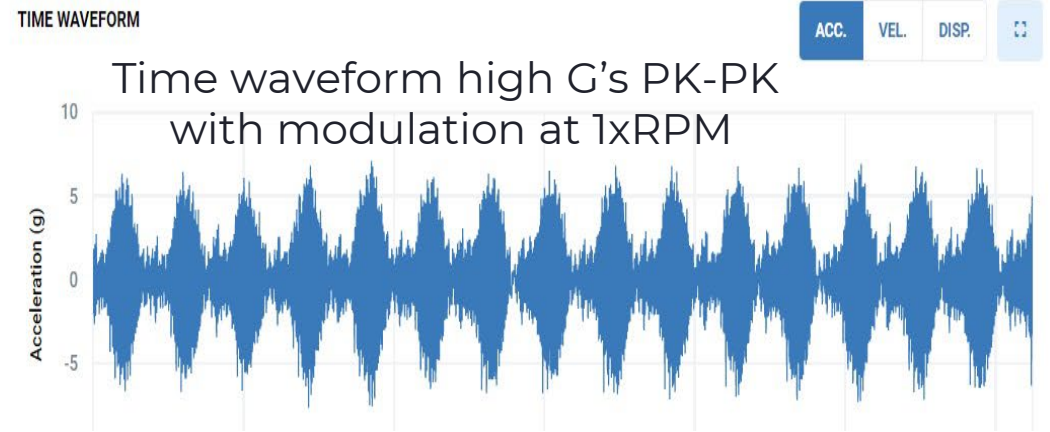
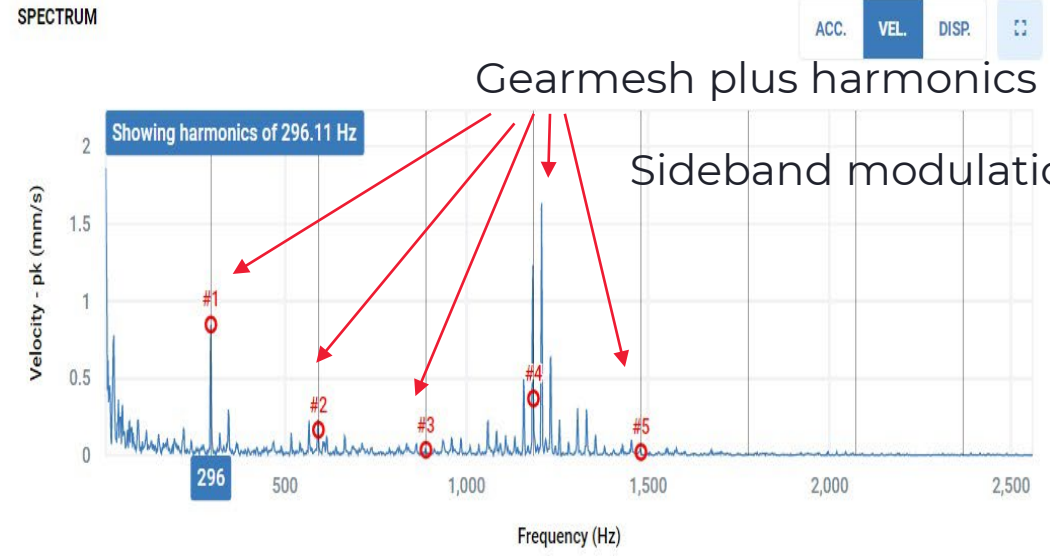
ANALYSIS OPTIONS
These settings are not saved

RPM

GEAR TOOTH COUNT

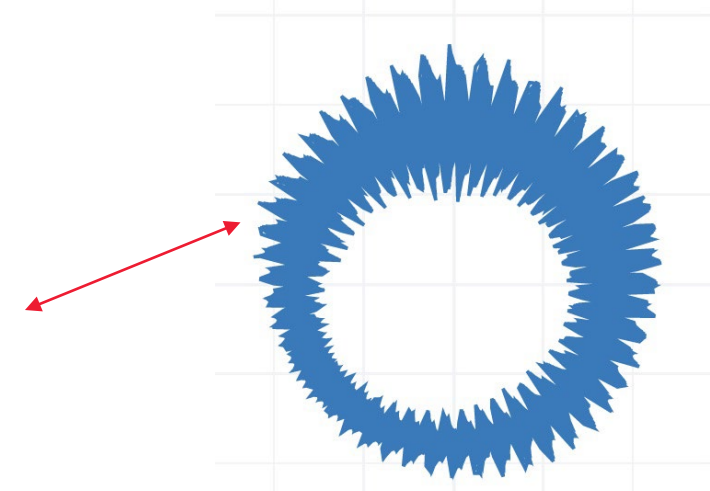
FFT WINDOWING

BEARING



Analysis

- Poor gearmesh suspected due to gearmesh harmonics
- 12 teeth x 1480 RPM / 24.6 Hz = **296Hz gear mesh frequency**
- 1XRPM sidebands / modulation in spectrum and waveform

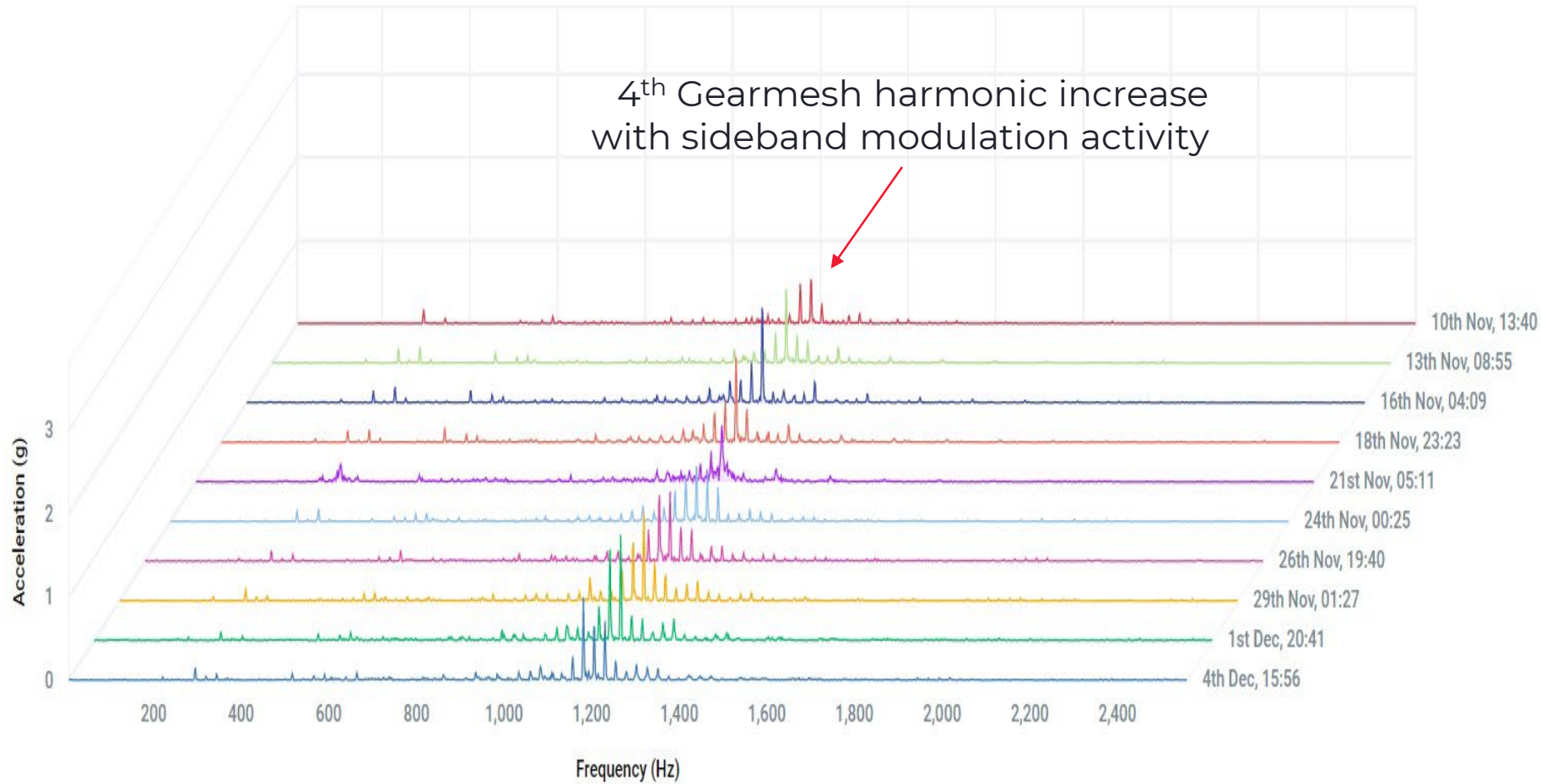


Circular time waveform plot autocorrelated

Gear Pump– Spectral Historical Data

ACCELERATION WATERFALL PLOT

Hann window ▾ **ACC.** VEL. DISP.

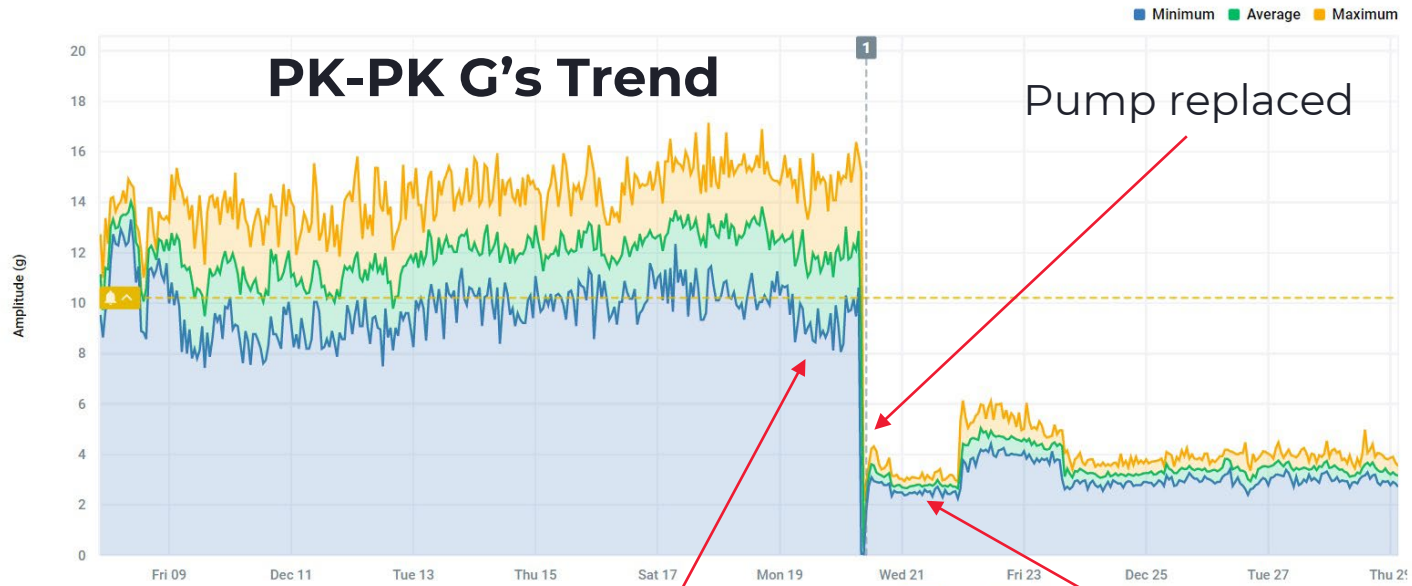


Analysis

- Increasing gearmesh vibration
- Increase in 1XRPM sideband modulation activity
- Recommendation to pull machine in planned outage for inspection

Gear Pump – Before & After

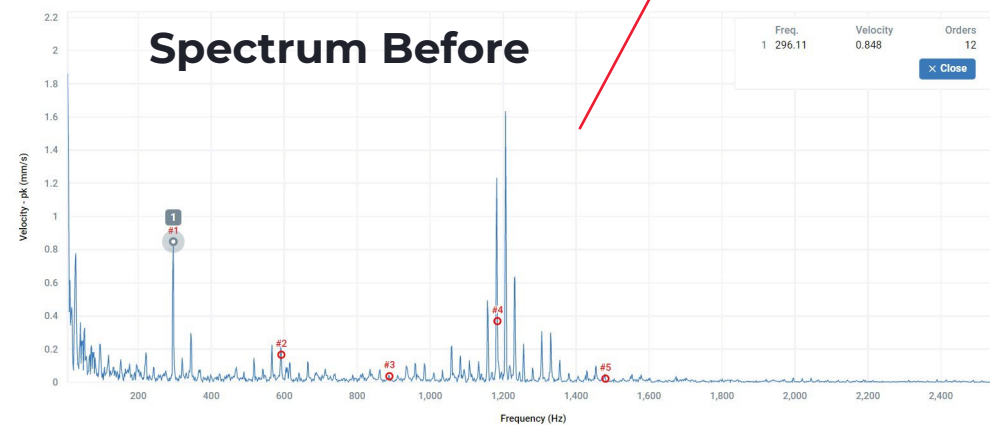
PEAK TO PEAK



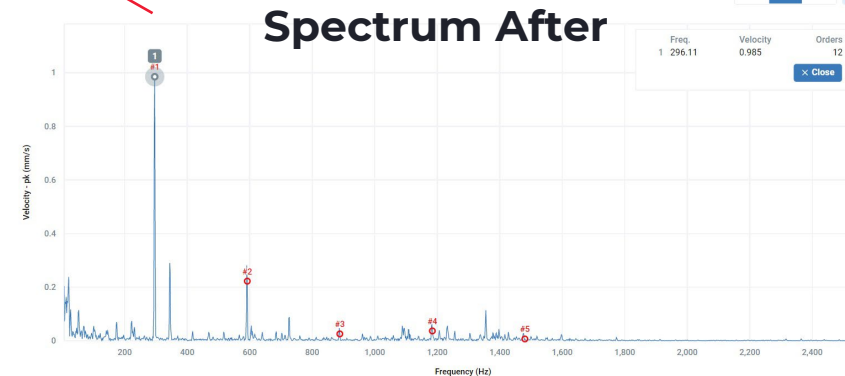
Analysis

- Pump replaced
- Reduction in vibration levels to 3 G's PK-PK
- New pump shows clean gearmesh

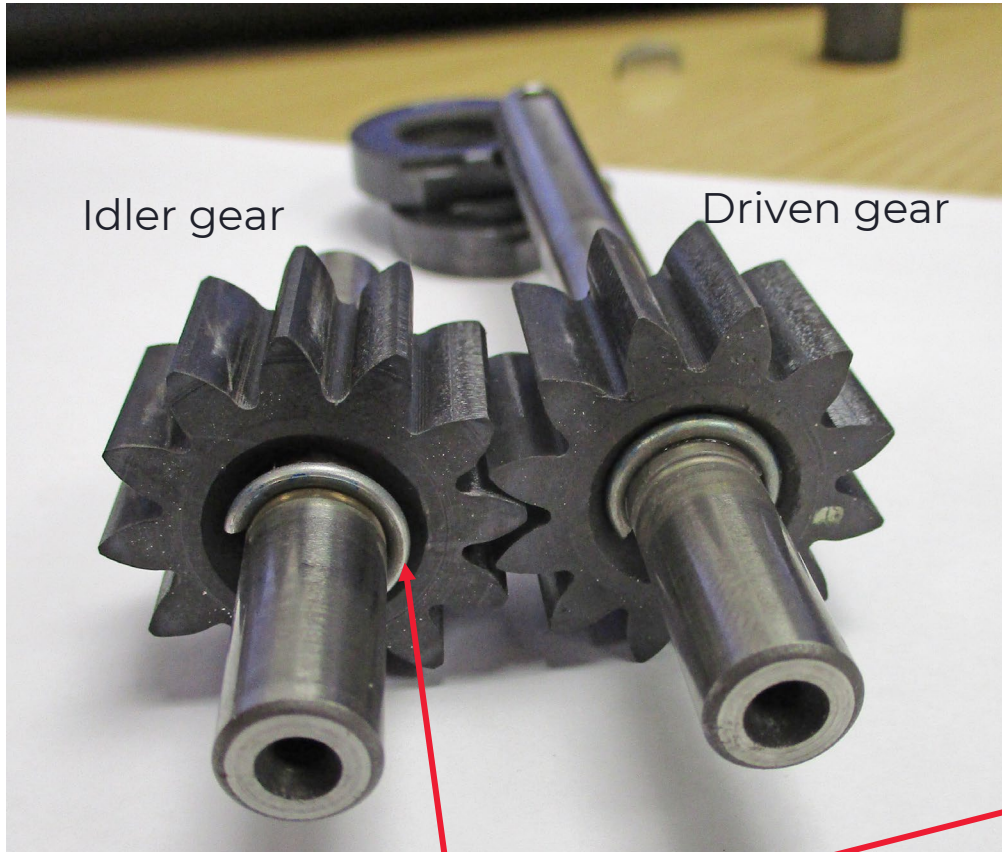
SPECTRUM



SPECTRUM



Gear Pump – Root Cause Analysis



Incorrect circlip placement



- ### Root Cause Analysis
- Incorrect fitment of circlip on idler gear causing poor meshing of gears (Loose gear)
 - Wear on gear key evident due to looseness
 - Occurred during OEM assembly



Estimated Avoided Cost Saving

Action Taken

Actual work done to repair the pump.

Materials: New pump parts
£1357.00

Labour: To remove pump & replace
Refit 2 hours x 1 man £35/hr
£70.00

Production Losses: None, due to having
bulk storage.

Total Cost: £1427.00

No Action Taken

Scenario: Secondary damage to the pump / motor
caused by the failure of the pump and Acid Pump
Bowl damage due to lack of seal water.

(Estimated Replacement Value) Seal Pump and Acid
Pump Bowl New Unit = **£30,167**

Labour: To remove motor / pump
Refit 12 hours x 2 man £52.50/hr
£1,260.00

Production Losses: none, due to bulk storage.

Total Cost: £31,427



Estimated Avoided Cost: £30,000



FURTHER INFORMATION

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