

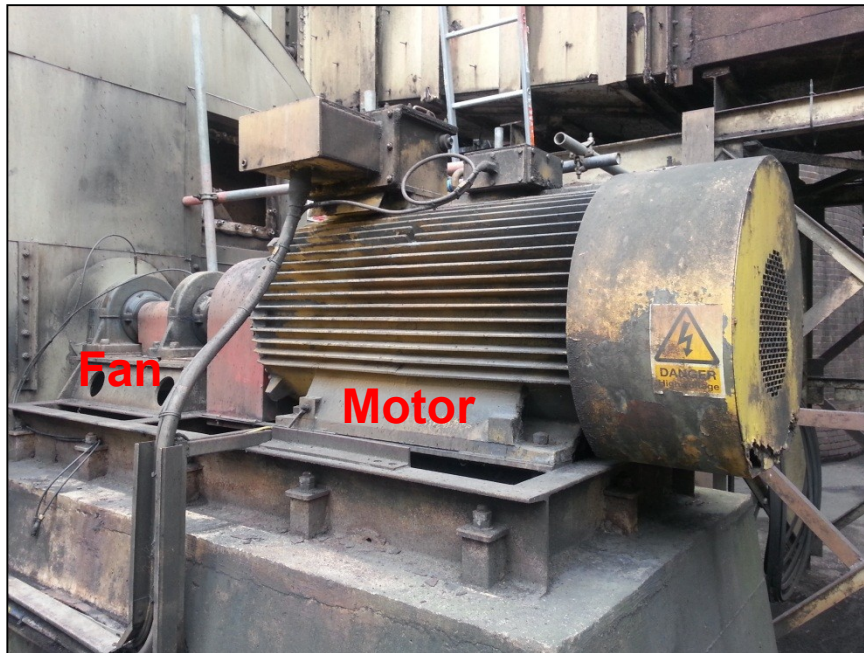
# Vibration Analysis

## *Case Study – Gas Recycle Fan*

**Presentation by: Stuart Walker**

**Reliability Maintenance Solutions Ltd**

## Vibration Analysis – Gas Recycle Fan

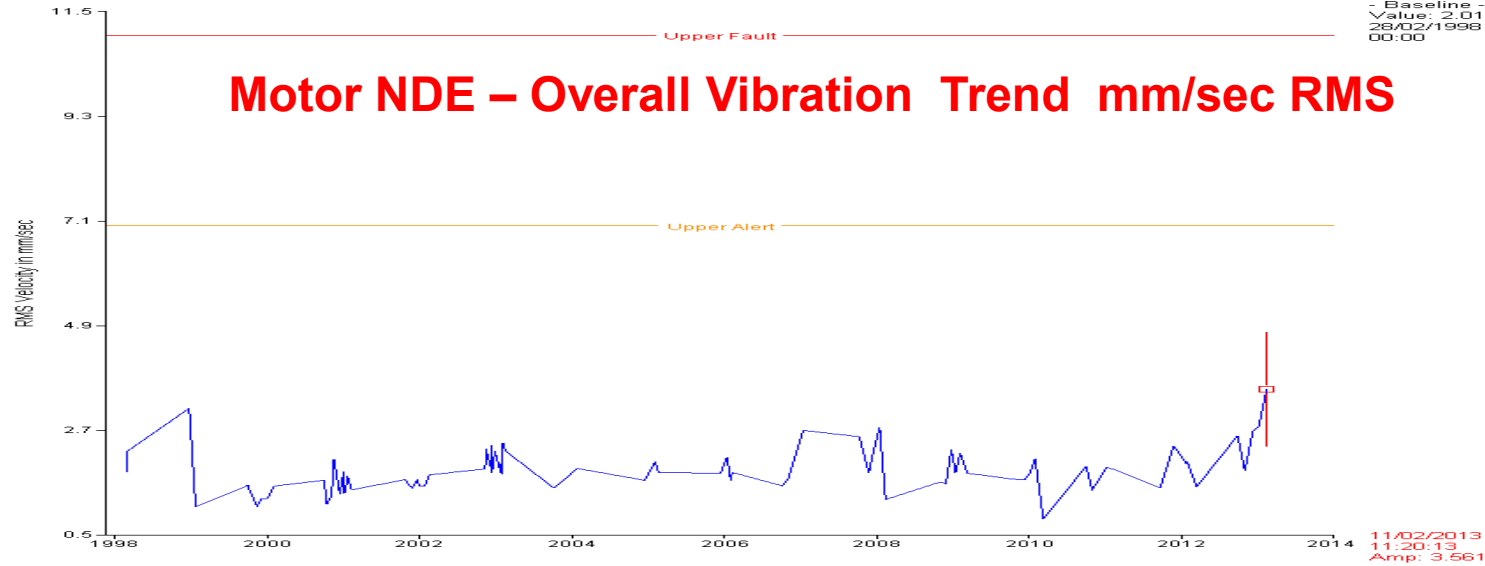


- The Gas Recycle Fan is part of an Animal Feeds Dryer Plant
- It is critical for the operation of the Dryer Plant. Failure will result in Dryer Plant shutdown
- Monthly Vibration readings are taken throughout the operation period.
- In Sept 2012 it was noticed an increase in vibration levels in the 3-4XRPM band on the motor NDE horizontal reading

DRAF - DRIERS / 38FANS618M - GAS RECYCLE FAN  
1H - MOTOR NDE HORIZONTAL

Overall Value  
- Baseline -  
Value: 2.019  
28/02/1998  
00:00

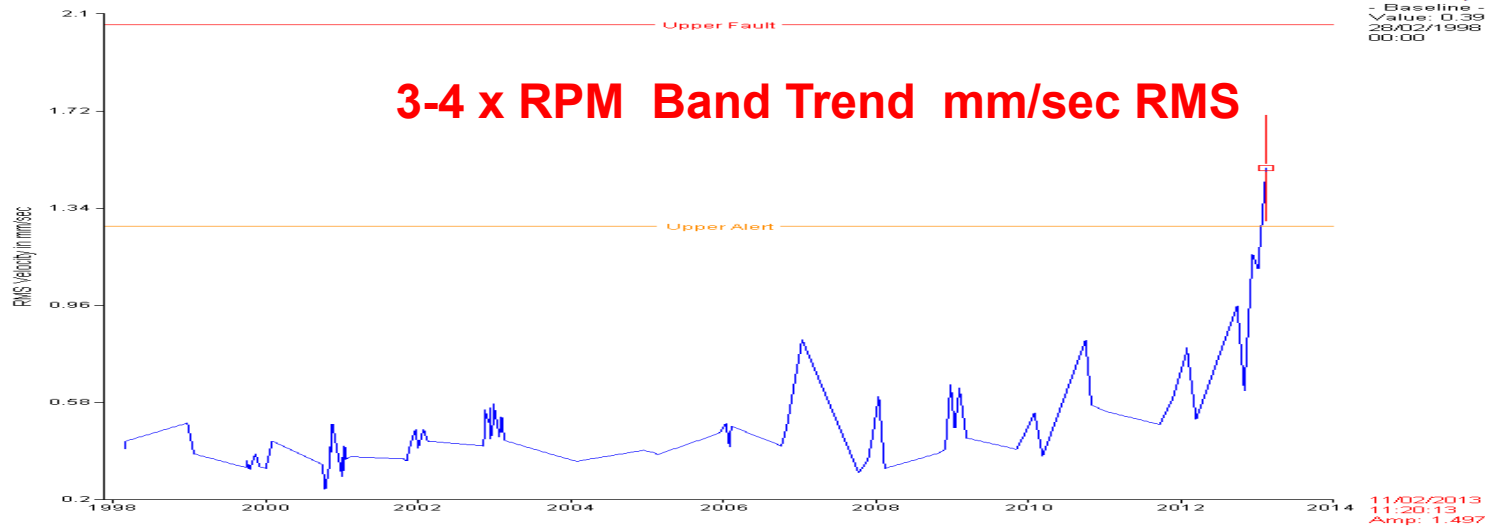
## Motor NDE – Overall Vibration Trend mm/sec RMS



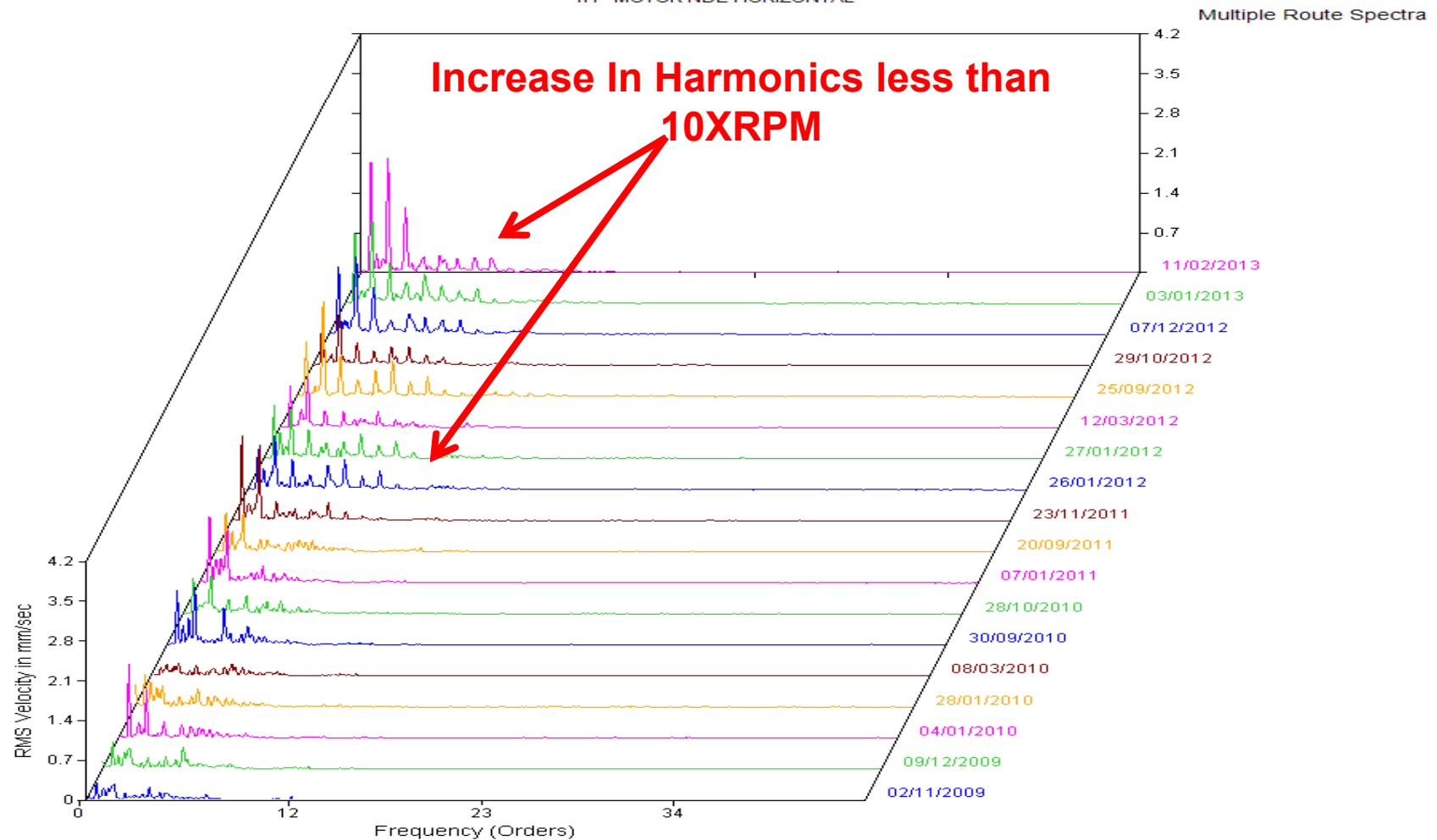
DRAF - DRIERS / 38FANS618M - GAS RECYCLE FAN  
1H - MOTOR NDE HORIZONTAL

3-4xrpm/loose  
- Baseline -  
Value: 0.397  
28/02/1998  
00:00

## 3-4 x RPM Band Trend mm/sec RMS



DRAF - DRIERS / 38FANS618M - GAS RECYCLE FAN  
1H - MOTOR NDE HORIZONTAL

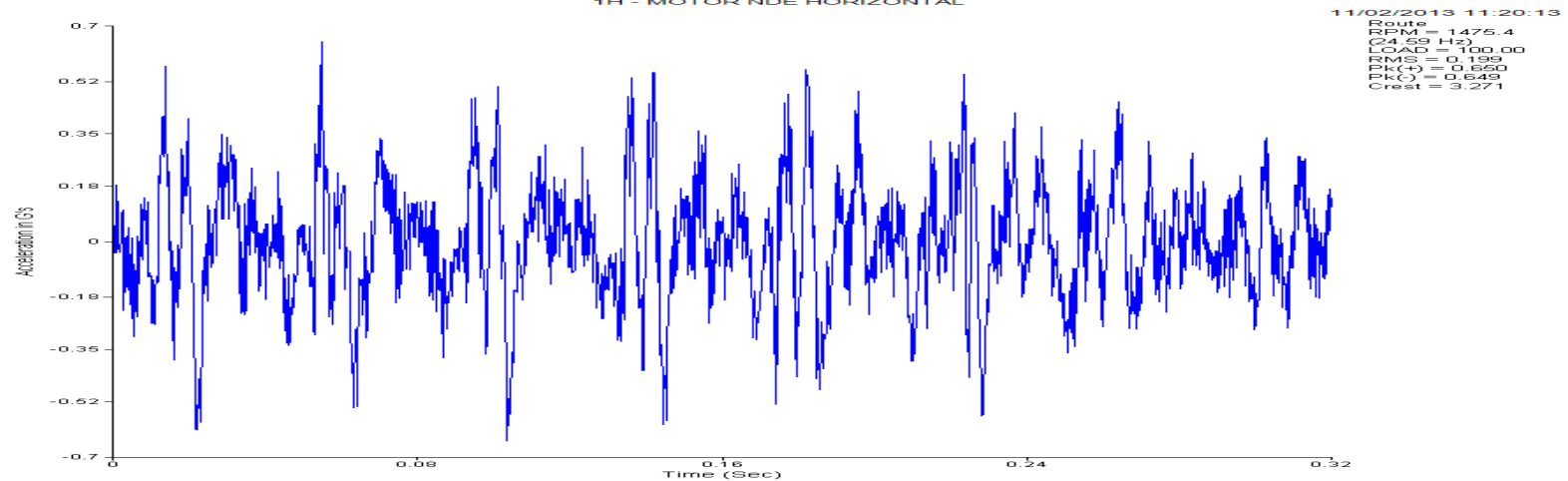
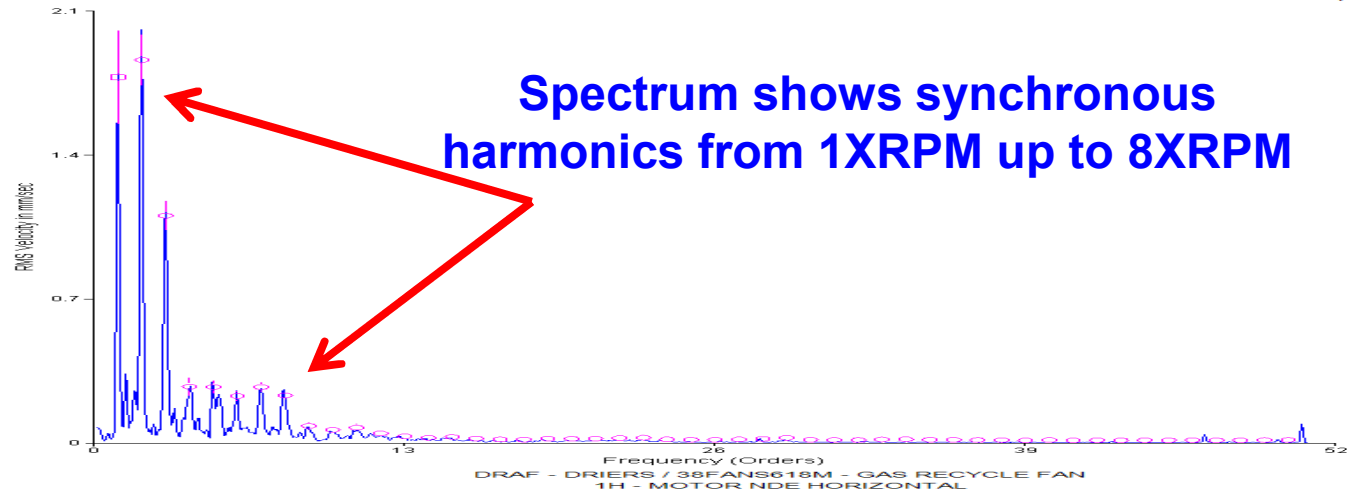


**Multiple Spectrum History Plot- Motor NDE Horiz**

DRAF - DRIERS / 38FANS618M - GAS RECYCLE FAN  
1H - MOTOR NDE HORIZONTAL

11/02/2013 11:20:13

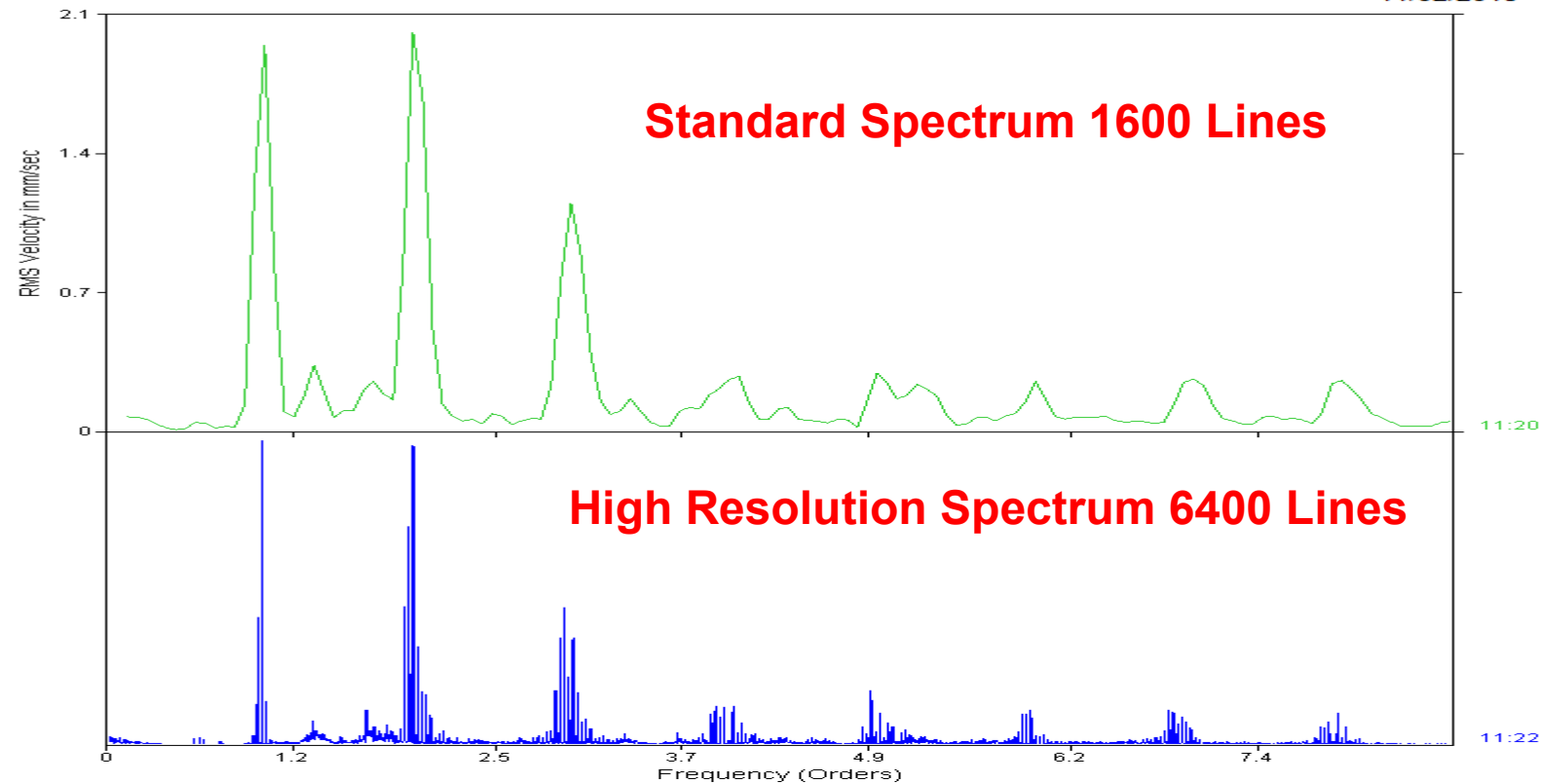
Route  
3.561 V.DG  
RMS = 3.657  
LOAD = 100.00  
RPM = 1475.4  
(24.59 Hz)



**Spectrum & Waveform - Motor NDE Horiz**

DRAF - DRIERS / 38FANS618M - GAS RECYCLE FAN  
1H - MOTOR NDE HORIZONTAL

11/02/2013 - Multiple Spectra

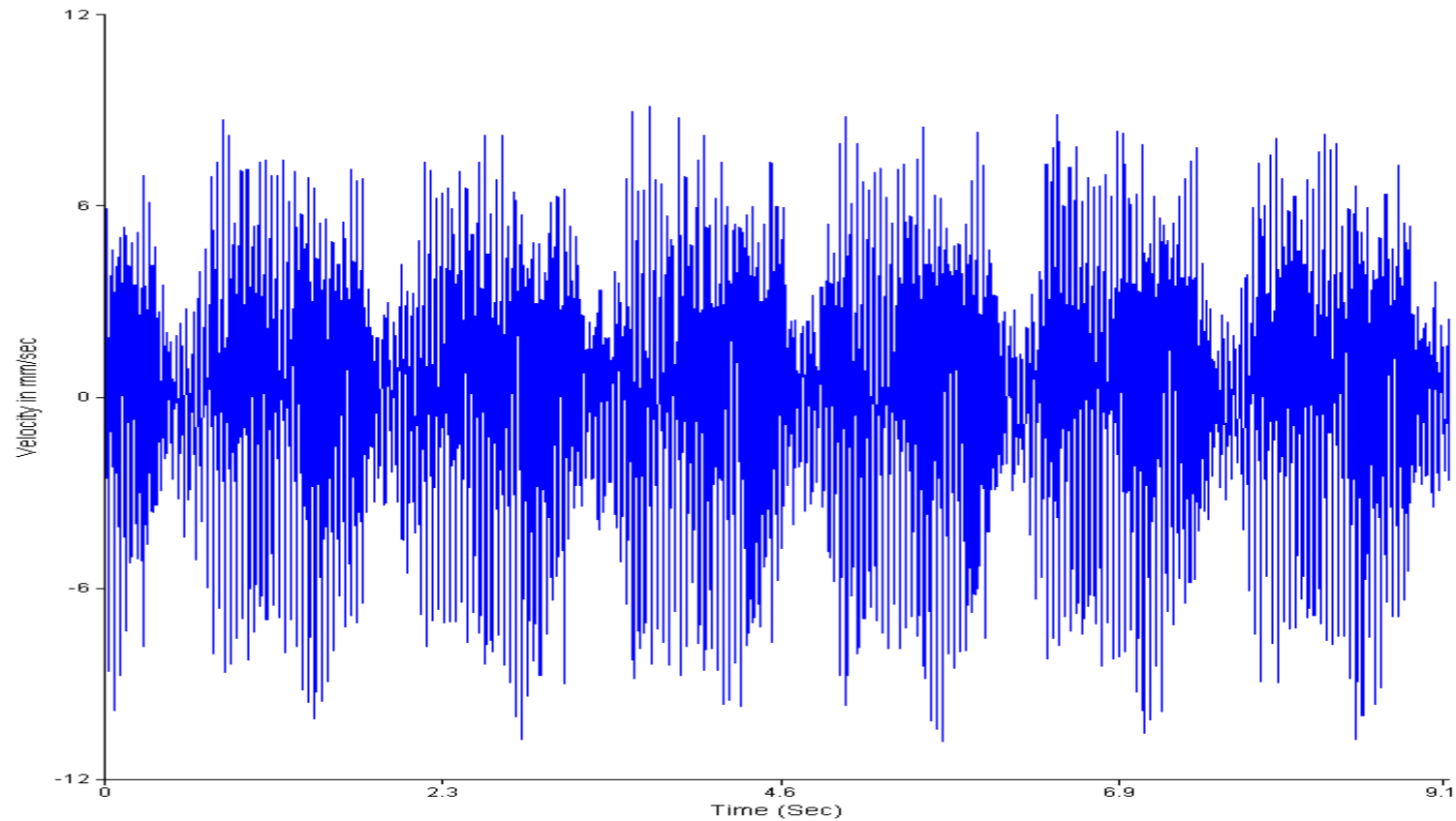


**High Resolution 6400 Line spectrum shows clear sidebands  
surrounding the 1-8 XRPM harmonics**

DRAF - DRIERS / 38FANS618M - GAS RECYCLE FAN  
1H - MOTOR NDE HORIZONTAL

11/02/2013 11:22:32

Analyze  
RPM = 1490.5  
(24.84 Hz)  
LOAD = 100.00  
RMS = 3.364  
Pk(+) = 9.884  
Pk(-) = 11.77  
Crest = 3.461



**Extended Time Waveform clearly shows a regular “Beat” is present,  
this was also audible.**

## Gas Recycle Fan – Motor Details



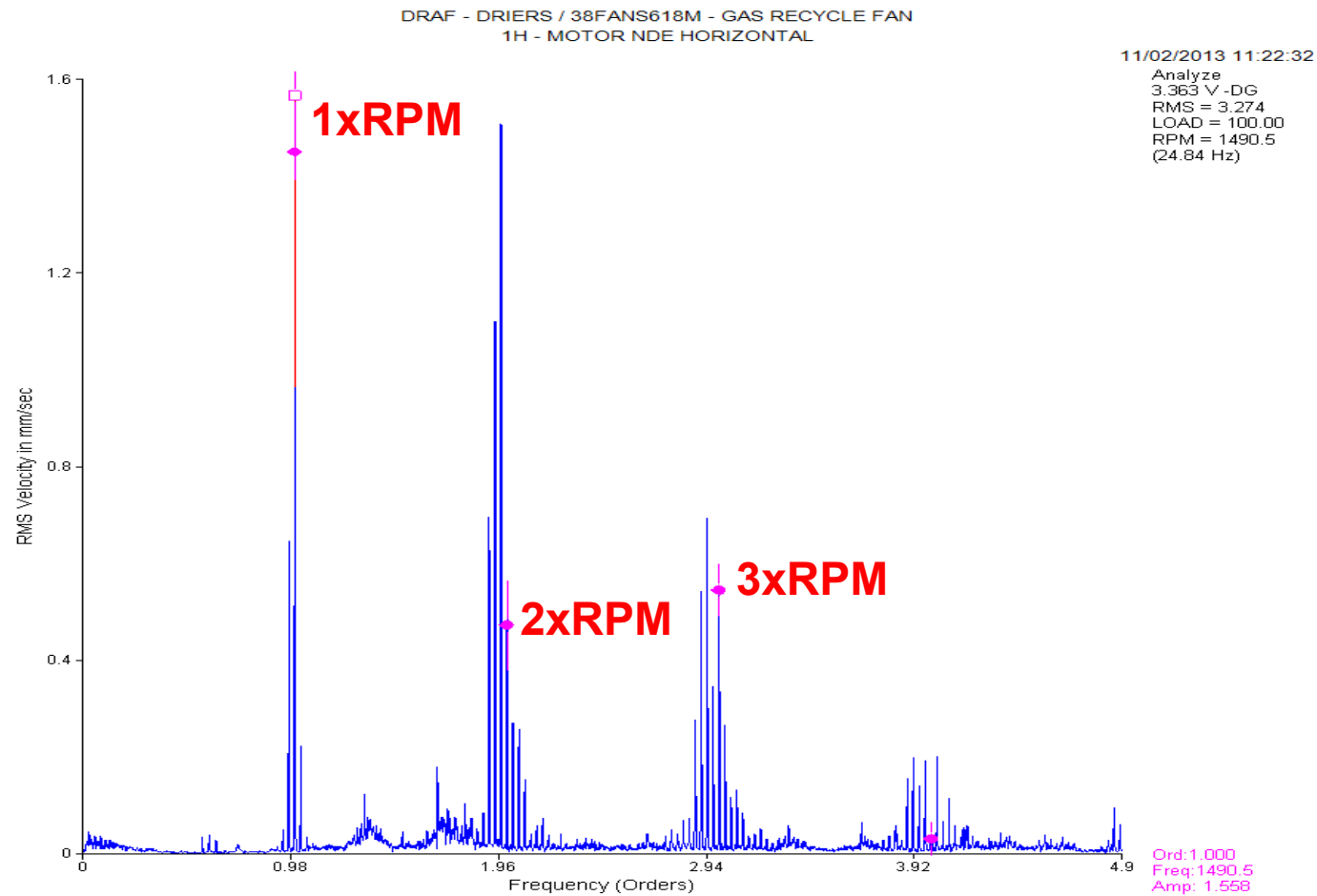
- Induction Motor
- Power 315 KW
- 1500 RPM.
- Actual Running Speed 1490 RPM
- 4 Poles
- Rolling Element Bearings



LAWRENCE SCOTT  
ELECTROMOTORS LTD  
NORWICH & MANCHESTER  
INDUCTION MOTOR  
MADE IN GREAT BRITAIN TO BS5000 PT 00:1973  
MOTOR TYPE SQ. GASE MOTOR NO. 0263001H  
FRAME SIZE D355/900 KW 315 RPM 1490  
AMPS 67 HZ 50 PHASE 3  
VOLTS 3300 PF 0.86 YEAR 1984  
RATING MAX. CONT. AMBIENT 40°C  
CLASS OF INSULATION F  
CONNECTION STAR L.E.F.  
BEARINGS DE N319 NDE G10 GROUP 3 FIT  
LUBRICANT SHELL ALVANIA R3  
STARTING TORQUE AS % OF FLT 80  
STARTING CURRENT AS % OF FLC 450  
ENCLOSURE TYPE IPW55  
ORDER NO. A/E 30514  
NET WEIGHT 2640 KGS

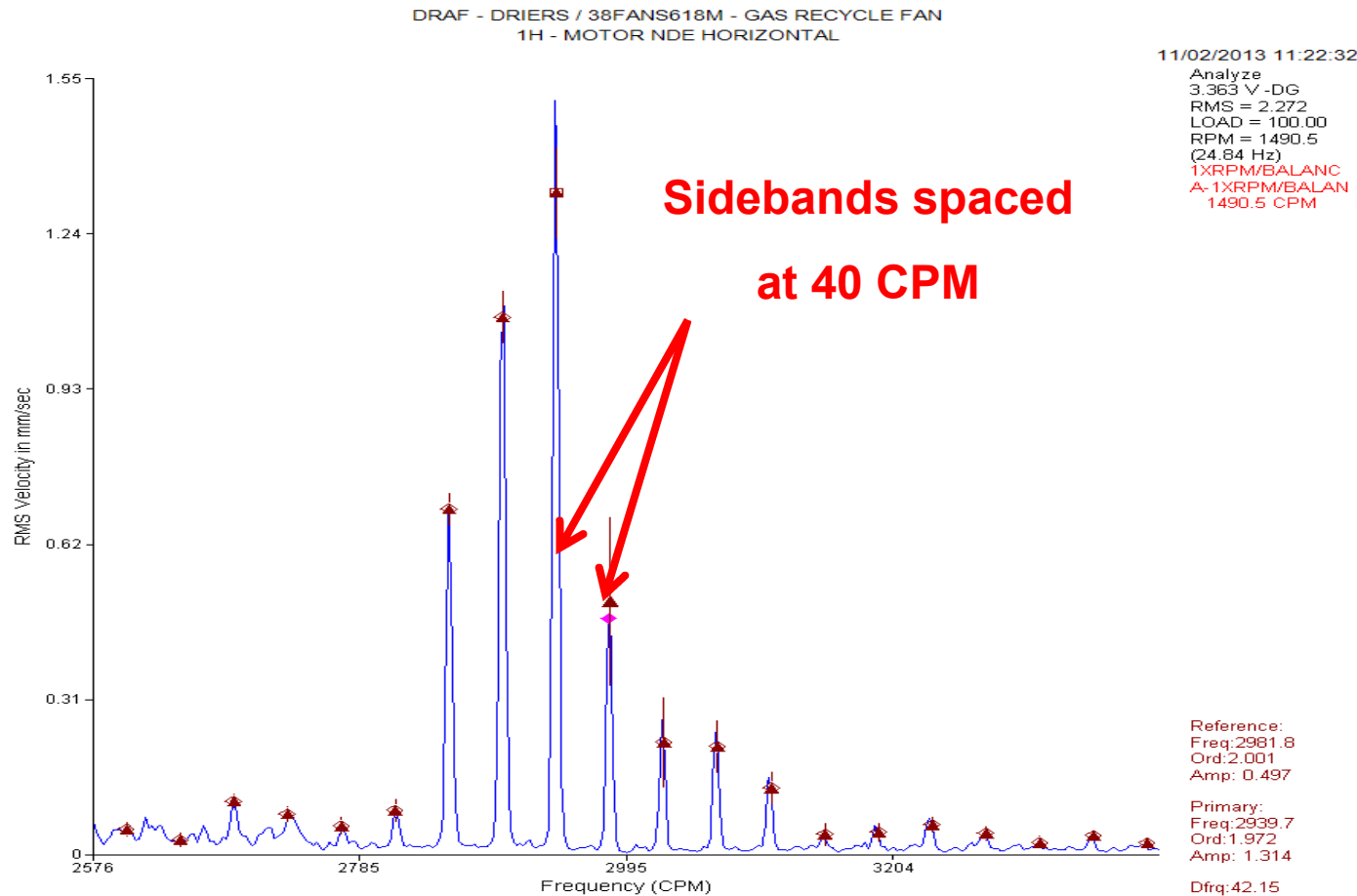


## Gas Recycle Fan Motor – Detailed Analysis



**High Resolution spectrum shows run speed harmonics surrounded by modulation sidebands**

## Gas Recycle Fan Motor – Detailed Analysis



Sidebands measured at 40 CPM (Cycles Per Min)

Suspected Rotorbar Problem

## Gas Recycle Fan Motor – Detailed Analysis

Rotorbar Defect Freq = No. of Poles x Slip Frequency

1500 RPM – 1490 RPM = 10 CPM Slip Frequency

4 Poles x 10 CPM Slip Freq = 40 Cycles Per Min

40 Cycles per min matches the spacing of the modulation sidebands surrounding the 1xRPM harmonics. This is also the frequency of the “Beat”



**Conclusion :**

**Rotorbar Defects Present on Motor**



**Upon Inspection - Rotobar found to be cracked**