vibration - thermography - oil analysis - laser alignment - in-situ balancing

unit 12, roseberry court, ellerbeck way, stokesley,
north yorkshire, ts9 5qt.

tel: 01642 714710 website: www.vibrotech.co.uk

vibration analysis report

CROWN JEDDAH BEVERAGE CAN FACTORY.

JEDDAH.

SAUDI ARABIA.

13th / 19th FEBRUARY

Equipment

The following equipment was used to carry out the vibration analysis:

SKF Microlog CMVA60.	Serial No 602995
CMSS6155 Optical Phase Reference:	Serial No 1514483
Accelerometers: Number: 1	Serial No 003088
Number: 2	Serial No 003087

SKF Prism4 Vibration Analysis Software.

Dell Notebook Computer.

Analyst

Mr T McManus.

Introduction

A Vibration Analysis was requested by Mr Mohamed EL-Sayed of Crown Jeddah Beverage Can Factory. Jeddah, Saudi Arabia.

Various unit's were analysed and where necessary, in-stu balancing carried out.

The units checked during the vibration analysis were:-

Line 1
Drier Re-Circulation Fans.
Zone 1 = *Pages 3 & 4*
Zone 2 = *Pages 5 & 6*

Line 2
Drier Re-Circulation Fan = *Pages 7 & 8.*
Vac Turn Over Blower Fan = *Page 9*.

Line 3
UV Supply Blower Fan = Page 10.
UV Exhaust Blower Fan = Page 11.

All quoted velocity amplitudes are mm/s RMS.
Overall Values are 10Kcpm frequency length.

Report

Line 1
Drier
Zone 1
Re-Circulation Fan

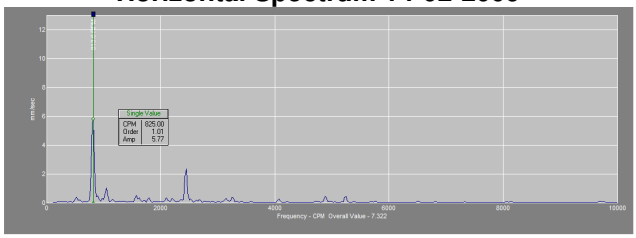
14th February 2009.

This unit was run up to full speed and a full set of vibration data was collected.

Fan Shaft
Drive End Bearing

The overall vibration in the horizontal direction was 7.3mm/s with a 1x (814rpm) frequency of 5.7mm/s **(See Fig 1 Fan Shaft Drive End Bearing Horizontal Spectrum)**..
The overall vibration in the vertical direction was 3.1mm/s with a 1x (814rpm) frequency of 2.3mm/s.

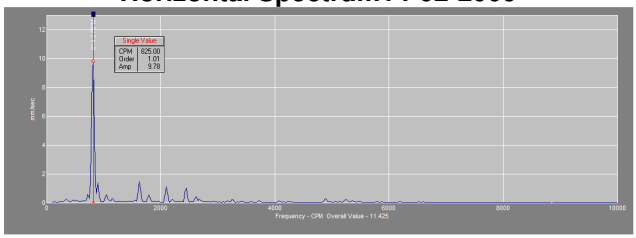
Fig 1
Fan Shaft Drive End Bearing
Horizontal Spectrum 14-02-2009



Fan Shaft
Non Drive End Bearing

The overall vibration in the horizontal direction was 11.43mm/s with a 1x (814rpm) frequency of 9.7mm/s **(See Fig 2 Fan Shaft Non Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction was 3.7mm/s with a 1x (814rpm) frequency of 3.1mm/s.
The overall vibration in the axial direction was 3.6mm/s with a 1x (814rpm) frequency of 2.4mm/s.

Fig 2
Fan Shaft Non Drive End Bearing
Horizontal Spectrum14-02-2009



Conclusion

Although the vibration was at acceptable levels using ISO Standard 2372, a decision was made to trim balance the fan to an improved level.

Report

Line 1
Drier
Zone 1
Re-Circulation Fan

15th February 2009.

This unit was trim balanced to an improved level using one weight of 180grams, which was permanently attached (welded) to the 'boss' of the non drive end impellor.

Fan Shaft
Drive End Bearing
After the trim balance the overall vibration in the horizontal direction reduced to 3.4mm/s with a 1x (814rpm) frequency of 3mm/s **(See Fig 3 Fan Shaft Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction reduced to 1.8mm/s with a 1x (814rpm) frequency of 1.6mm/s.

Fan Shaft
Non Drive End Bearing
After the trim balance the overall vibration in the horizontal direction reduced to 1.6mm/s with a 1x (814rpm) frequency of 1mm/s **(See Fig 4 Fan Shaft Non Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction reduced to 1.3mm/s with a 1x (814rpm) frequency of 1.2mm/s.
The overall vibration in the axial direction reduced to 1.5mm/s with a 1x (814rpm) frequency of 1mm/s.

Summary

The unit was then monitored at various times over the following days until was running back at full temperature. The vibration remained at the improved level **(See Fig 5 & 6 Fan Shaft Bearing Horizontal Trends)**

Fig 3
Fan Shaft Drive End Bearing
Horizontal Spectrum 15-02-2009

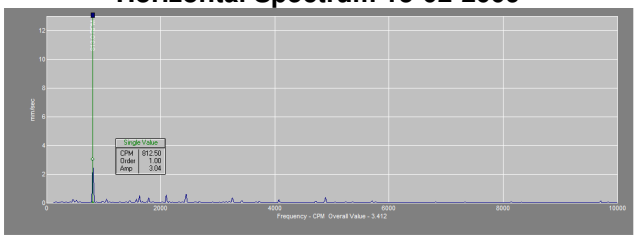


Fig 4
Fan Shaft Non Drive End Bearing
Horizontal Spectrum15-02-2009

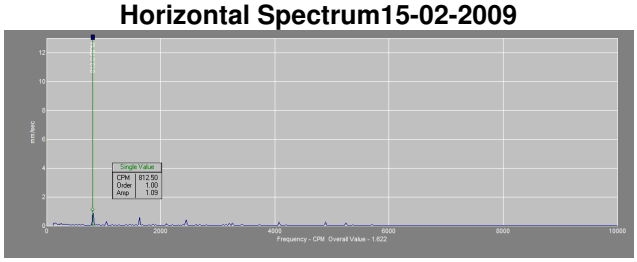


Fig 5
Fan Shaft Drive End Bearing
Horizontal Trend 14/18-02-2009

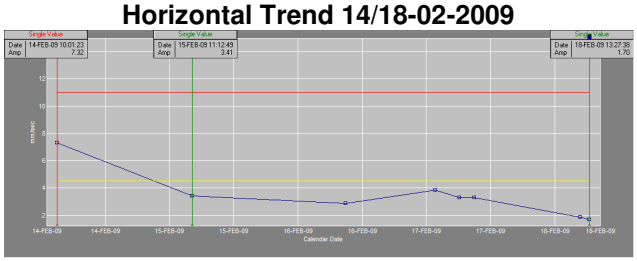
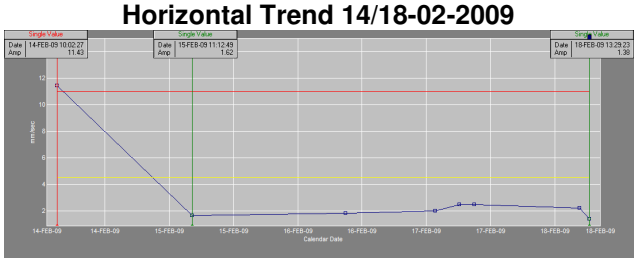


Fig 6
Fan Shaft Non Drive End Bearing
Horizontal Trend 14/18-02-2009



Report

Line 1
Drier
Zone 2
Re-Circulation Fan

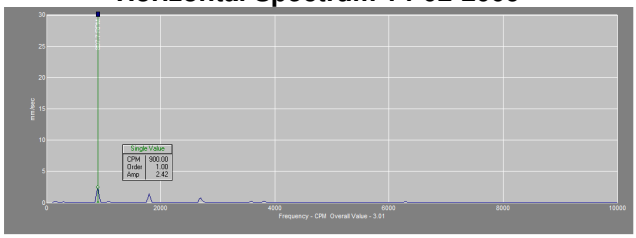
14th February 2009.

This unit was run up to full speed and a full set of vibration data was collected.

Fan Shaft
Drive End Bearing

The overall vibration in the horizontal direction was 3mm/s with a 1x (897rpm) frequency of 2.4mm/s **(See Fig 7 Fan Shaft Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction was 4.2mm/s with a 1x (897rpm) frequency of 3.3mm/s.

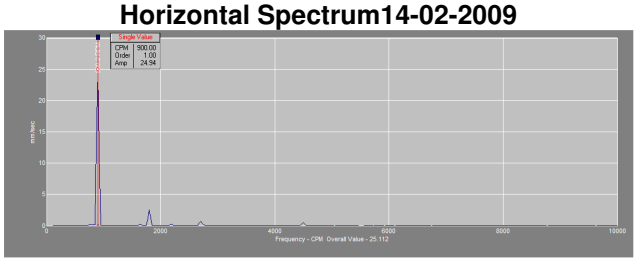
Fig 7
Fan Shaft Drive End Bearing
Horizontal Spectrum 14-02-2009



Fan Shaft
Non Drive End Bearing

The overall vibration in the horizontal direction was 25.1mm/s with a 1x (897rpm) frequency of 24.9mm/s **(See Fig 8 Fan Shaft Non Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction was 1.8mm/s with a 1x (897rpm) frequency of 0.8mm/s.
The overall vibration in the axial direction was 2.7mm/s with a 1x (897rpm) frequency of 2.2mm/s.

Fig 8
Fan Shaft Non Drive End Bearing
Horizontal Spectrum14-02-2009



Conclusion

Due to the amplitude of the non drive end bearing reading in the horizontal direction, a decision was made to trim balance the fan to an improved level.

Report

Line 1
Drier
Zone 2
Re-Circulation Fan

14th February 2009.

This unit was trim balanced to a satisfactory level using one weight of 205grams, which was permanently attached (welded) to the 'boss' of the non drive end impellor.

Fan Shaft
Drive End Bearing
After the trim balance the overall vibration in the horizontal direction reduced to 1.6mm/s with a 1x (897rpm) frequency of 1.2mm/s **(See Fig 9 Fan Shaft Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction reduced to 2.2mm/s with a 1x (897rpm) frequency of 1.2mm/s.

Fan Shaft
Non Drive End Bearing
After the trim balance the overall vibration in the horizontal direction reduced to 1.8mm/s with a 1x (897rpm) frequency of 0.8mm/s **(See Fig 10 Fan Shaft Non Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction reduced to 1.1mm/s with a 1x (897rpm) frequency of 0.4mm/s.
The overall vibration in the axial direction reduced to 1.5mm/s with a 1x (814rpm) frequency of 0.6mm/s.

Summary

The unit was then monitored at various times over the following days until running back at full temperature. The vibration remained at the improved level **(See Fig 11 & 12 Fan Shaft Bearing Horizontal Trends)**

Fig 9
Fan Shaft Drive End Bearing
Horizontal Spectrum 14-02-2009

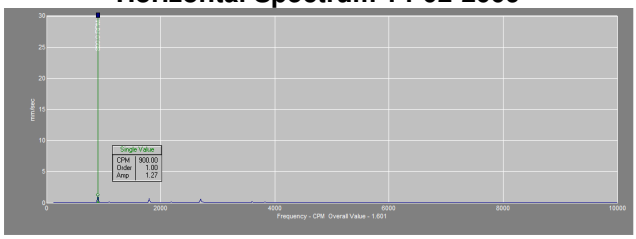


Fig 10
Fan Shaft Non Drive End Bearing
Horizontal Spectrum14-02-2009

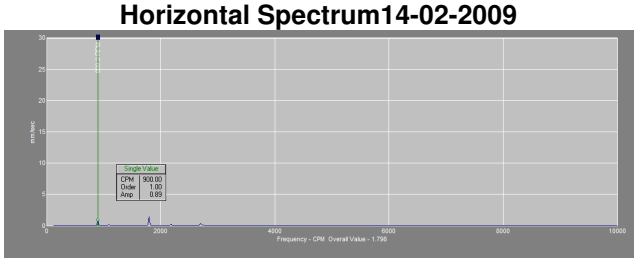


Fig 11
Fan Shaft Drive End Bearing
Horizontal Trend 14/18-02-2009

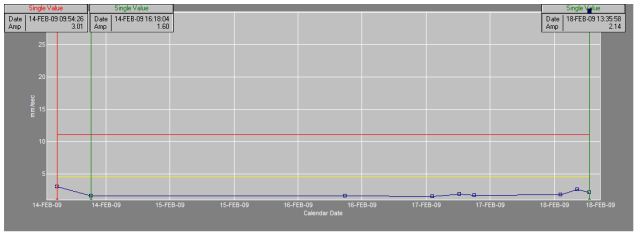
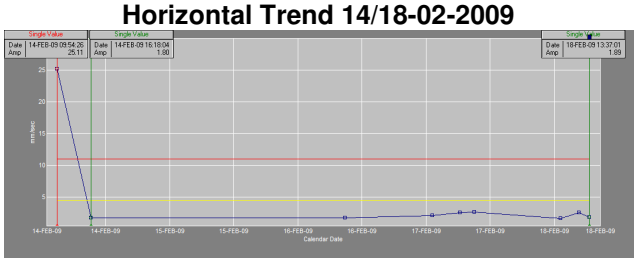


Fig 12
Fan Shaft Non Drive End Bearing
Horizontal Trend 14/18-02-2009



Report

Line 2
Drier
Re-Circulation Fan

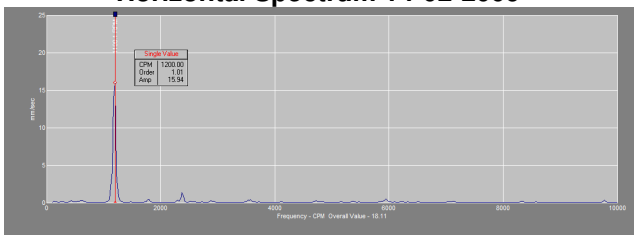
14th February 2009.

This unit was run up to full speed and a full set of vibration data was collected.

Fan Shaft
Drive End Bearing

The overall vibration in the horizontal direction was 18.1mm/s with a 1x (1188rpm) frequency of 15.9mm/s **(See Fig 13 Fan Shaft Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction was 18.6mm/s with a 1x (1188rpm) frequency of 16.1mm/s.

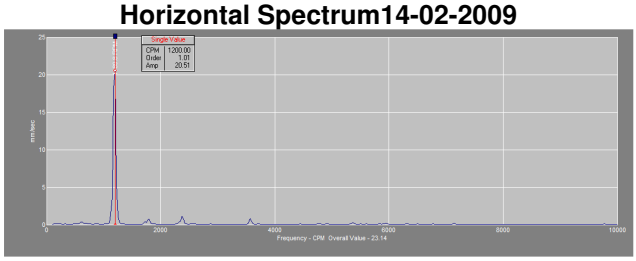
Fig 13
Fan Shaft Drive End Bearing
Horizontal Spectrum 14-02-2009



Fan Shaft
Non Drive End Bearing

The overall vibration in the horizontal direction was 23.1mm/s with a 1x (1188rpm) frequency of 20.5mm/s **(See Fig 14 Fan Shaft Non Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction was 27.1mm/s with a 1x (1188rpm) frequency of 24.1mm/s.
The overall vibration in the axial direction was 3.6mm/s with a 1x (1188rpm) frequency of 2.1mm/s.

Fig 14
Fan Shaft Non Drive End Bearing
Horizontal Spectrum14-02-2009



Conclusion

Due to the amplitude of readings on this unit, a decision was made to trim balance the fan to an improved level.

Report

Line 2
Drier
Re-Circulation Fan

15th February 2009.

This unit was trim balanced to a satisfactory level using one weight of 285grams, which was permanently attached (welded) to the 'boss' of the non drive end impellor.

Fan Shaft
Drive End Bearing
After the trim balance the overall vibration in the horizontal direction reduced to 3.2mm/s with a 1x (1188rpm) frequency of 2.6mm/s **(See Fig 15 Fan Shaft Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction reduced to 5.6mm/s with a 1x (1188rpm) frequency of 4.2mm/s.

Fan Shaft
Non Drive End Bearing
After the trim balance the overall vibration in the horizontal direction reduced to 6.3mm/s with a 1x (1188rpm) frequency of 5.4mm/s **(See Fig 16 Fan Shaft Non Drive End Bearing Horizontal Spectrum)**.
The overall vibration in the vertical direction reduced to 8mm/s with a 1x (1188rpm) frequency of 7.9mm/s.
The overall vibration in the axial direction reduced to 3.1mm/s with a 1x (1188rpm) frequency of 2.5mm/s.

Fig 15
Fan Shaft Drive End Bearing
Horizontal Spectrum 15-02-2009

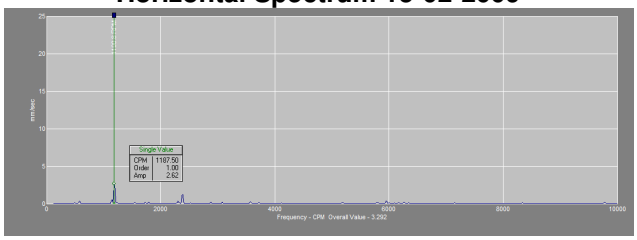


Fig 16
Fan Shaft Non Drive End Bearing
Horizontal Spectrum15-02-2009

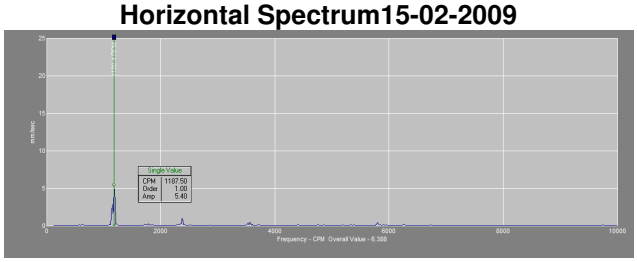


Fig 17
Fan Shaft Drive End Bearing
Horizontal Trend 14/18-02-2009

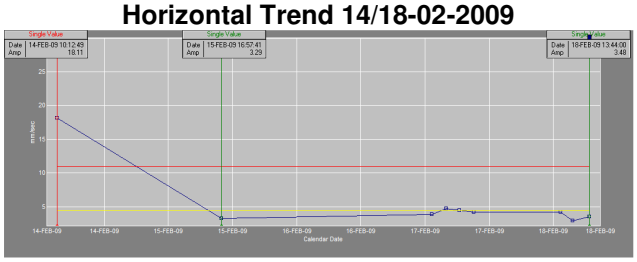
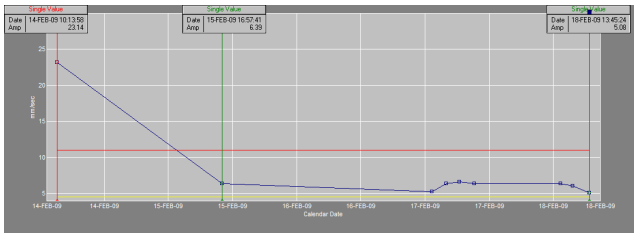


Fig 18
Fan Shaft Non Drive End Bearing
Horizontal Trend 14/18-02-2009



Summary

The unit was then monitored at various times over the following days until running back at full temperature and the line back in full production. The vibration remained at the improved level **(See Fig 17 & 18 Fan Shaft Bearing Horizontal Trends)**

Recommended Action

Although the readings on this unit are at a satisfactory level, further improvements could be made if as discussed during the site visit, the base is secured to the platform, and the drive belt size (rpm) is changed to eliminate the 'beat frequency'.

Report

Line 2

Vac Turn Over Blower

16th February 2009.

This unit was started at 10.50am and was checked at various times throughout the day until 16.00pm, to monitor the vibration and bearing condition.

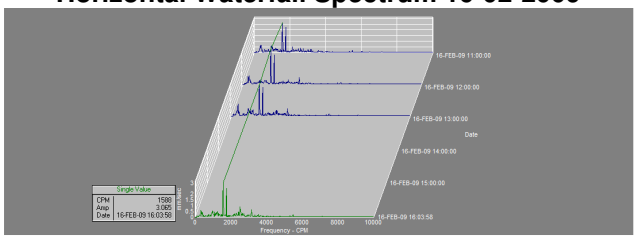
Motor & Fan Shaft

The vibration levels on this unit are at a satisfactory level using ISO Standards 2372.

Fan Shaft
Drive End Bearing

The overall vibration in the horizontal direction was <5mm/s with a 1x (1587rpm) frequency of 3mm/s **(See Fig 19 Fan Shaft Drive End Bearing Horizontal Waterfall Spectrum)**.
The overall vibration in the vertical direction was <3mm/s with a 1x (1587rpm) frequency of 1.7mm/s.

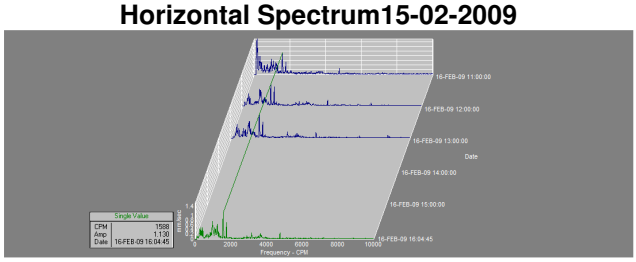
Fig 19
Fan Shaft Drive End Bearing
Horizontal Waterfall Spectrum 16-02-2009



Fan Shaft
Non Drive End Bearing

The overall vibration in the horizontal direction was <4mm/s with a 1x (1587rpm) frequency of 1.1mm/s **(See Fig 20 Fan Shaft Non Drive End Bearing Horizontal Waterfall Spectrum)**.
The overall vibration in the vertical direction was <2.5mm/s with a 1x (1587rpm) frequency of 0.5mm/s.
The overall vibration in the axial direction was <4.6mm/s with a 1x (1587rpm) frequency of 0.7mm/s.

Fig 20
Fan Shaft Non Drive End Bearing
Horizontal Spectrum15-02-2009



Report

Line 3

UV Supply Blower

16/17th February 2009.

This unit was checked at various times, to monitor the vibration and bearing condition.

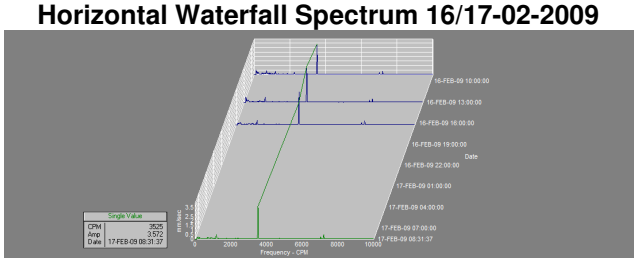
Motor

The vibration levels on this unit are at a satisfactory level using ISO Standards 2372.

Motor
Non Drive End Bearing

The overall vibration in the horizontal direction was <4.2mm/s with a 1x (3530rpm) frequency of 3.5mm/s **(See Fig 21 Motor Non Drive End Bearing Horizontal Waterfall Spectrum)**.
The overall vibration in the vertical direction was <3.5mm/s with a 1x (3530rpm) frequency of 2.3mm/s.

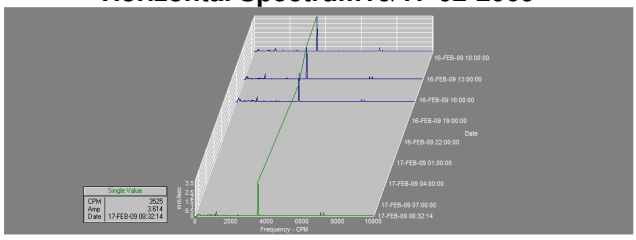
Fig 21
Motor Non Drive End Bearing
Horizontal Waterfall Spectrum 16/17-02-2009



Motor
Drive End Bearing

The overall vibration in the horizontal direction was <4.2mm/s with a 1x (3530rpm) frequency of 3.6mm/s **(See Fig 22 Fan Shaft Non Drive End Bearing Horizontal Waterfall Spectrum)**.
The overall vibration in the vertical direction was <2.5mm/s with a 1x (3530rpm) frequency of 1.9mm/s.
The overall vibration in the axial direction was <4.2mm/s with a 1x (3530rpm) frequency of 3mm/s.

Fig 22
Motor Drive End Bearing
Horizontal Spectrum16/17-02-2009



Report

Line 3

UV Exhaust Blower

16/17th February 2009.

This unit was checked at various times, to monitor the vibration and bearing condition.

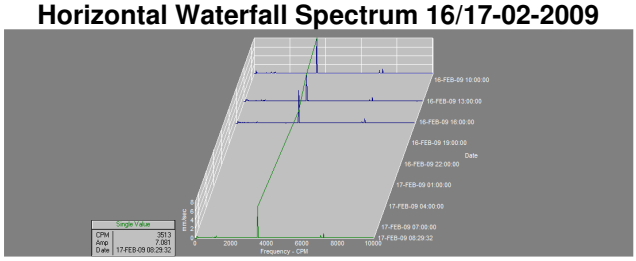
Motor

The vibration levels on this unit are at an unacceptable level using ISO Standards 2372.

Motor
Non Drive End Bearing

The overall vibration in the horizontal direction was <8.3mm/s with a 1x (3525rpm) frequency of 7mm/s **(See Fig 23 Motor Non Drive End Bearing Horizontal Waterfall Spectrum)**.
The overall vibration in the vertical direction was <9mm/s with a 1x (3525rpm) frequency of 8.1mm/s.

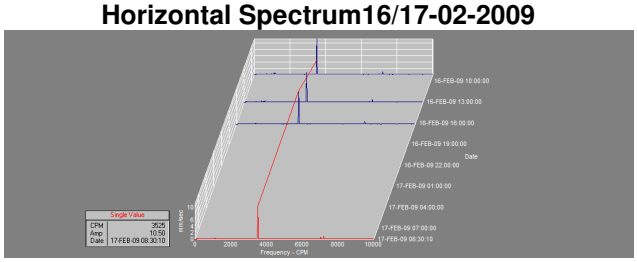
Fig 23
Motor Non Drive End Bearing
Horizontal Waterfall Spectrum 16/17-02-2009



Motor
Drive End Bearing

The overall vibration in the horizontal direction was <11.5mm/s with a 1x (3525rpm) frequency of 10.5mm/s **(See Fig 24 Fan Shaft Non Drive End Bearing Horizontal Waterfall Spectrum)**.
The overall vibration in the vertical direction was <15mm/s with a 1x (3525rpm) frequency of 12mm/s.
The overall vibration in the axial direction was <14.8mm/s with a 1x (3525rpm) frequency of 13.3mm/s.

Fig 24
Motor Drive End Bearing
Horizontal Spectrum16/17-02-2009



Recommendation

Using ISO Standard 2372 the drive end vertical and axial vibration on this unit is at an unacceptable level. These levels may be improved by trim balancing the fan, however I would recommend firstly checking the flooring/structure beneath this unit is structurally sound, and there are no blockages to the air flow to and from this unit causing flow turbulence.