

**THIS REPORT HAS BEEN SPECIALLY PREPARED FOR:**

**XYZ CORPORATION**

**Balance Report**

**Prepared for:**

**M/D/Y**

**Report:**

Six dryer fans were balanced at the XYZ Corporation M/D/Y. This report contains information related to that balance.

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<b>Contact:</b>	<b>Technician:</b> G. Hutto, D. Dantzler
<b>Company:</b> XYZ Corporation	<b>Machine:</b> 6 Dryer Fans

**BALANCE REPORT**

**General:**

MDI was requested to inspect and balance, if necessary, 6 dryer fans.

All 6 fans were inspected and required balancing.

The fans were of similar design. There are two dryer sections. One section has 4 fans, the second has 2 fans. The motors and fans are all of over hung design. The fan design, (not necessarily the dryer cells), is similar to the following:



Rotor:	Overhung, Closed Vane/blade
Rotor weight:	Approximately 30lbs. (estimate)
Rotor Balance Diameter:	Approximately 30"
Rotor Speed:	Variable Frequency Drive, rpm (as detected by laser tach.)

**Methods:**

MDI uses portable FFT data collection and analysis equipment combined with a laser or photo detector to measure the effect of unbalance on a system and to calculate any corrections if required.

Balance data supplied in the before and after graphs was taken at 60 Hz. or 1782 rpm.

**Specification:**

MDI uses the general ISO Specification prescribed in ISO 1940.01.

**Specification:** Total Residual Unbalance Not-To-Exceed a vibration amplitude of .25 ips field (in-place) balance requirement. This value meets or exceeds ISO 1940.01 for a 1782 rpm rotor using balance grade G6.3.

**Summary:**

1. All 6 fans required balancing.
2. The fan drive end bearing vibration values are within specification ISO 1940.01. The opposite drive end bearing vibration values on some of the fans do not meet this specification. This is explained in item 2 below. MDI was instructed to make the balance as good as possible with the time available.
3. All of the fans exhibited characteristics of having either resonance, looseness or structural weakness (or a combination) at approximately 50 Hz. – 55 Hz. This condition is problematic as the fans increase in vibration amplitude disproportionately at this frequency range. For pure unbalance, the amplitude should increase to the square of the speed. As an example, doubling the speed should produce four times the amount of vibration. Two of the fans, 53-201 and 53-202 were chosen for testing at various frequencies (plots attached). These tests show that the amplitudes increases were as much as sixty nine times (see plot for fan 53-202 at 30 Hz. vs. 60 Hz.) when the speed was doubled. This condition makes field balancing of the fans at full speed virtually impossible. It is the opinion of MDI that this condition should be addressed if operation at the 50 Hz. to 60 Hz. range is desired.
4. The fans run exceptionally smooth at 40 Hz. or less. At full rpm, 60 Hz. the fans vibrate more than desirable. MDI is familiar with this style fan and it is our experience that most fans of similar design can be made to operate at lower amplitudes. While this condition is not dangerous and the fans can operate at this level, in the large picture, some fan life may be sacrificed due the higher vibration values. We would also like to point out that as the fans accumulate parasitic load (dust from product etc.) they may be prone to disproportionate vibration increases. Simply put, if they are vibrating at higher amplitudes now and have a resonant and/or structural weakness issue, it is possible that they may vibrate much worse if they collect dust from product or elsewhere.
5. Fans 53-201, 53-202, 53-203 and 53-204 were so significantly out of balance that it was unsafe to operate them at full rpm. These fans were first balanced at half speed, 30 Hz. then trim balanced at 60 Hz.
6. An unusually large amount of balance weight had to be applied to fans 53-201 and 53-204. Fan 53-201 required approximately 16 oz. of weight and fan 53-204 required approximately 22 oz.
7. There was no visible evidence that fans 53-201, 53-202, 53-203 and 53-204 were balanced prior to the arrival of MDI. There were no weights visible on the rotor and there was no evidence of metal removal from the rotor, fan structure or fan seal. MDI is suspects that these fans were not balanced prior to installation.
8. Fans 53-231 and 53-232 have evidence of balance prior to the arrival of MDI. Weights were present on the rotors.
9. Fan 53-231 seems to be somewhat eccentric by perhaps as much as  $\frac{3}{4}$  inches. The fan rotor appears to not be centered rotor to cone.

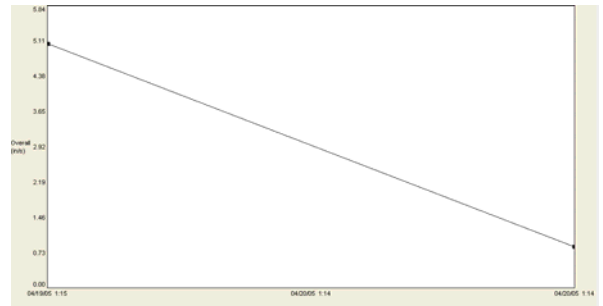
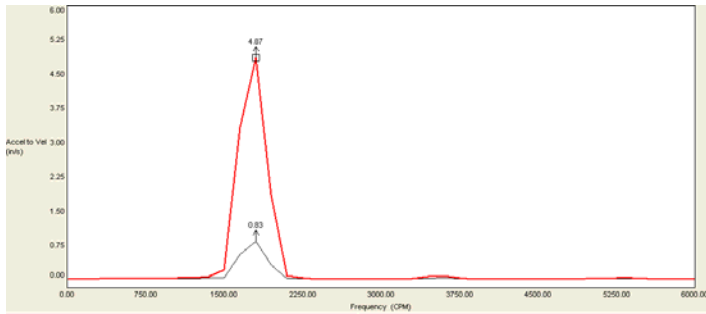
**Recommendations:**

1. Consult the fan manufacturer on the subject of a possible resonant frequency range or structural weakness issue at 50 Hz. to 60 Hz. Perhaps they are aware of the condition and can offer some tested solution. Inspect for any loose mounting components.
2. Perform testing on the fans to determine if the condition is resonant or structural weakness (or a combination of both.) Solutions can be considered once the source is properly identified.

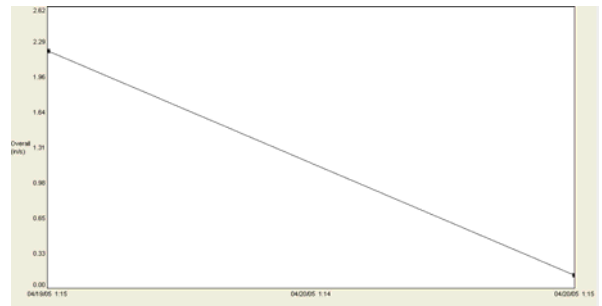
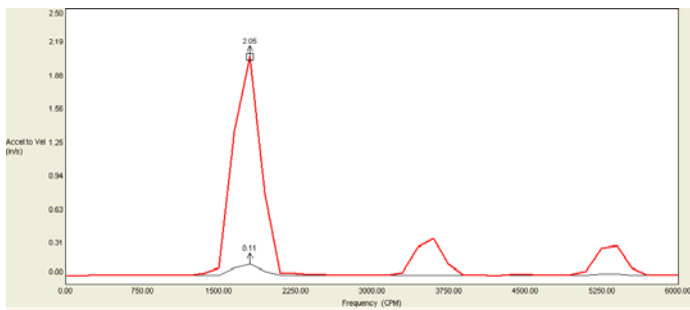
**BALANCE REPORT**

**FAN 53-201**  
**07C0401**

**53-201 Opposite Drive-End Motor Bearing Before and After Balance :**



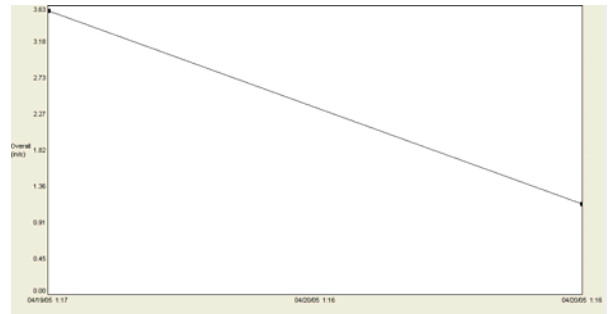
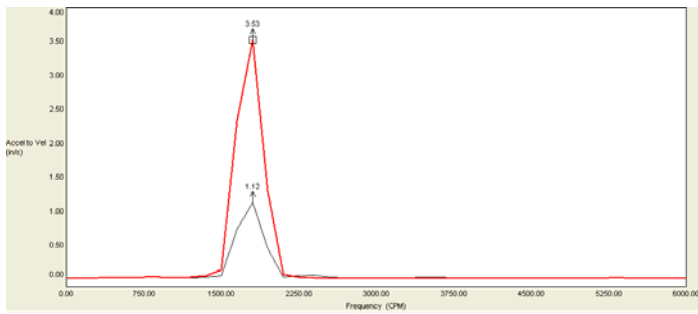
**53-201 Drive-End Motor Bearing Before and After Balance :**



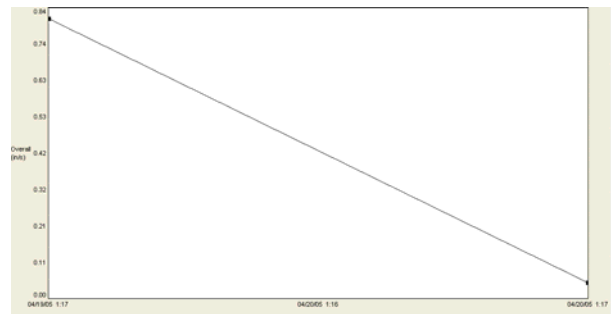
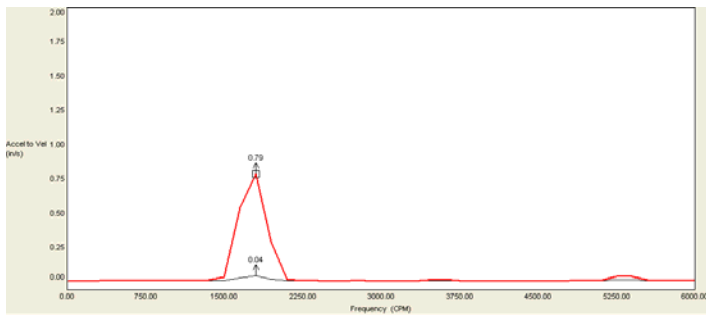
**BALANCE REPORT**

**FAN 53-202**  
**07C0402**

**53-202 Opposite Drive-End Motor Bearing Before and After Balance :**



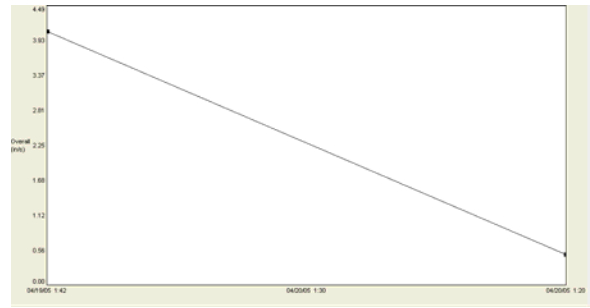
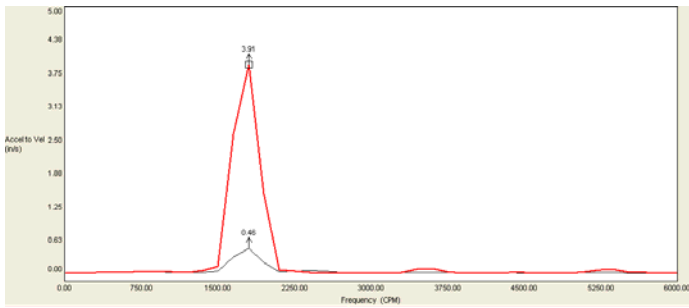
**53-202 Drive-End Motor Bearing Before and After Balance :**



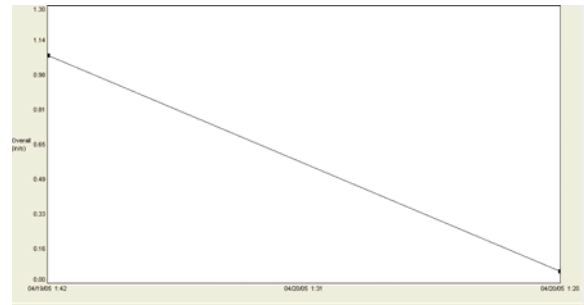
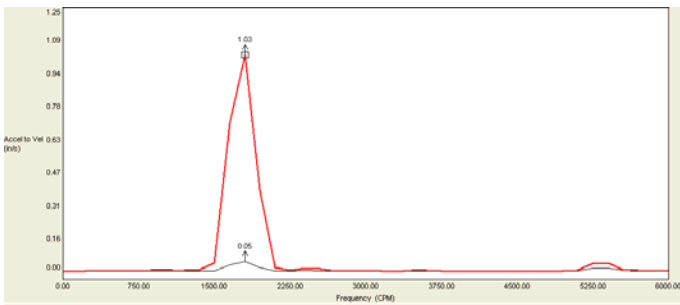
**BALANCE REPORT**

**FAN 53-203**  
**07C0403**

**53-203 Opposite Drive-End Motor Bearing Before and After Balance :**



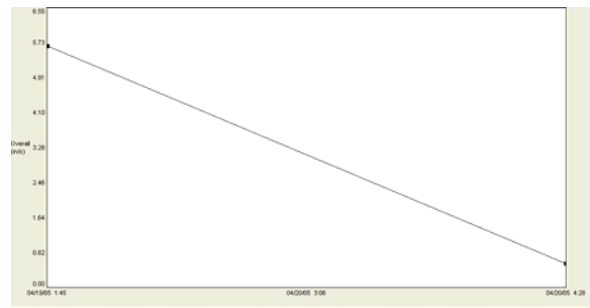
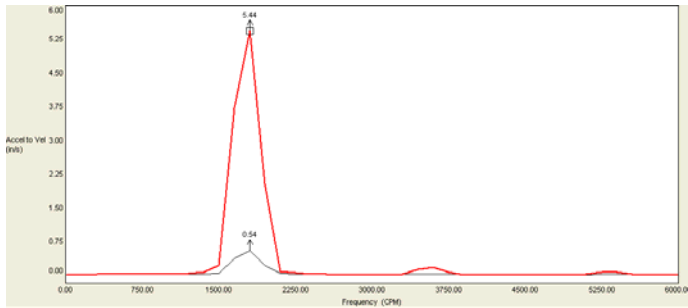
**53-203 Drive-End Motor Bearing Before and After Balance :**



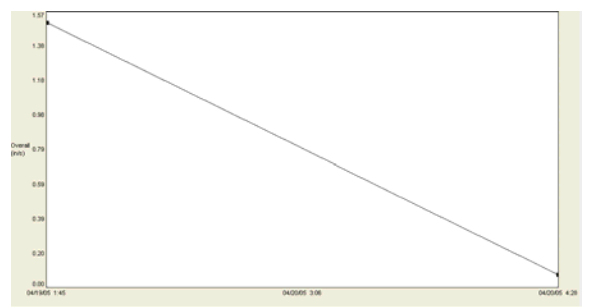
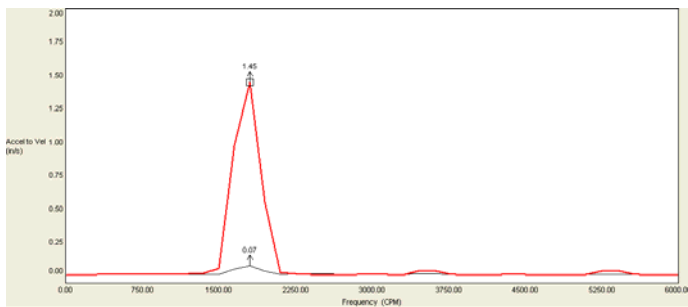
**BALANCE REPORT**

**FAN 53-204**  
**07C0404**

**53-204 Opposite Drive-End Motor Bearing Before and After Balance :**



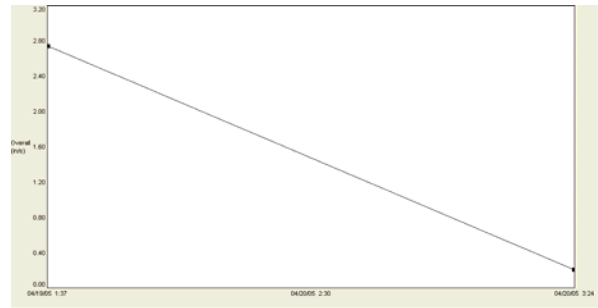
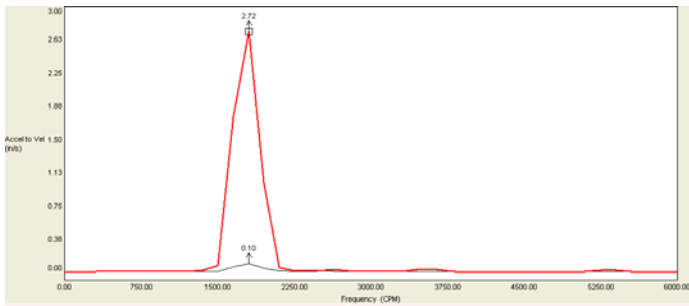
**53-204 Drive-End Motor Bearing Before and After Balance :**



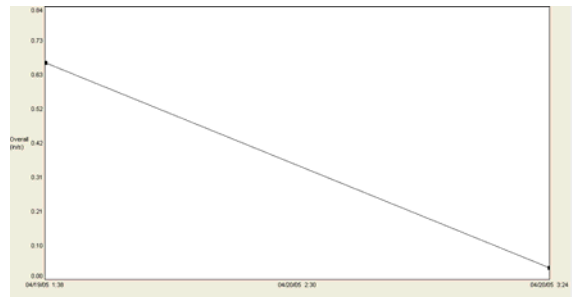
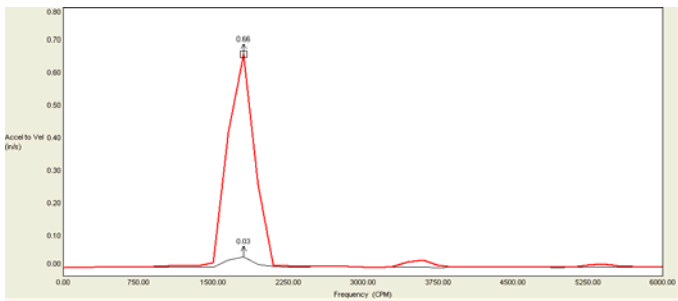
**BALANCE REPORT**

**FAN 53-231**  
**07C0461**

**53-231 Opposite Drive-End Motor Bearing Before and After Balance :**



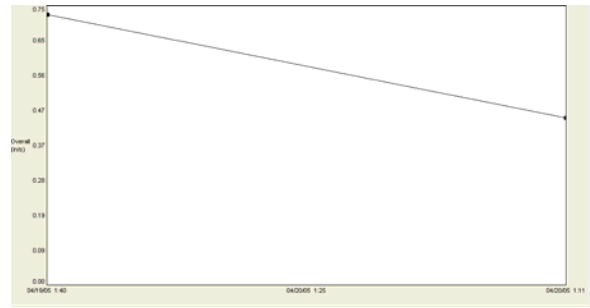
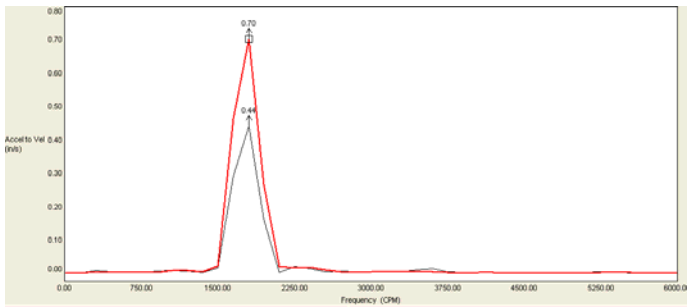
**53-231 Drive-End Motor Bearing Before and After Balance :**



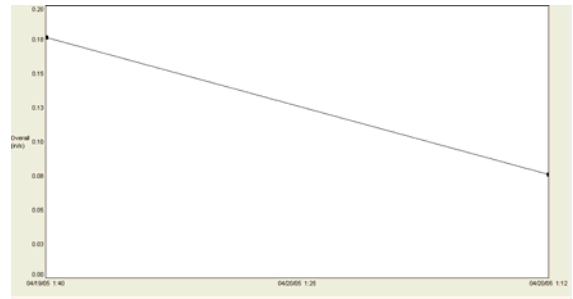
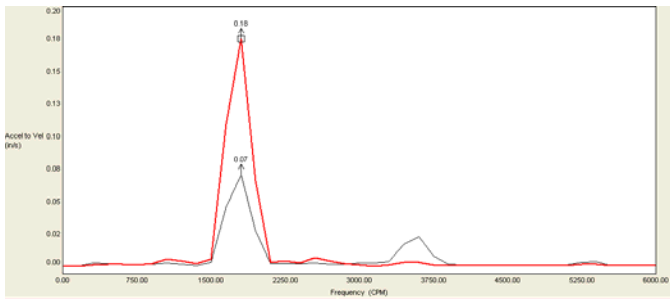
**BALANCE REPORT**

**FAN 53-232**  
**07C0462**

**53-232 Opposite Drive-End Motor Bearing Before and After Balance :**

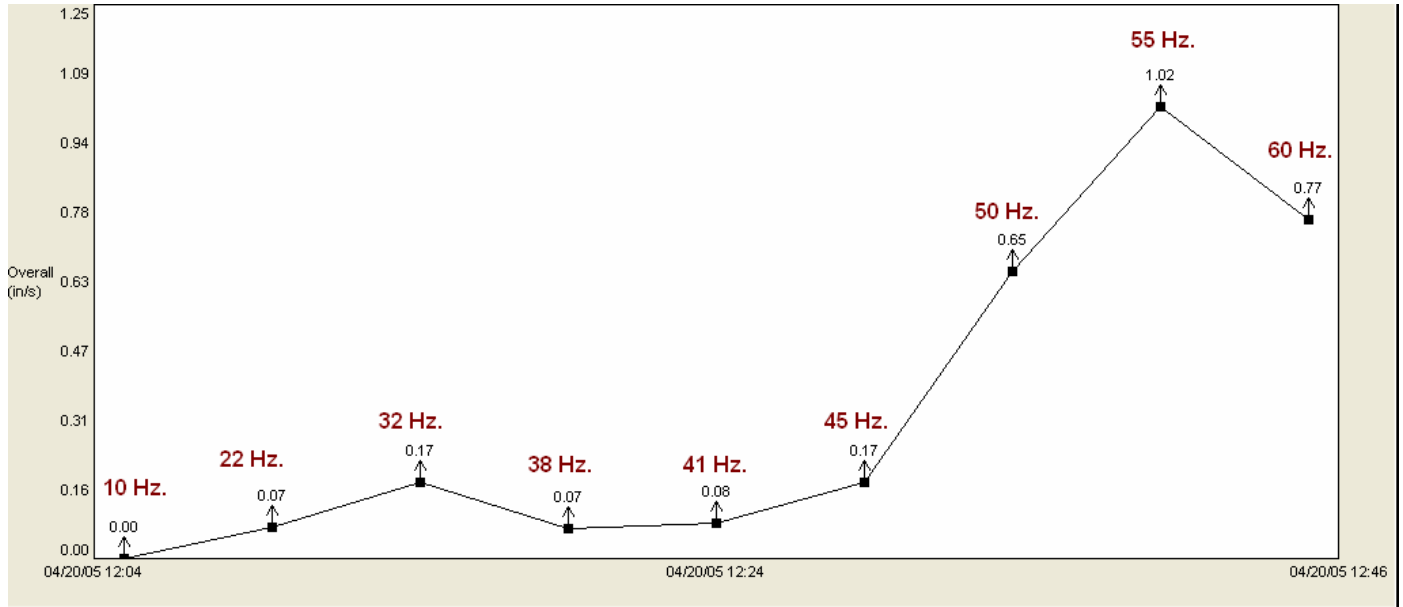


**53-232 Drive-End Motor Bearing Before and After Balance :**



**BALANCE REPORT**

**Plot of Variable Frequency Testing on Fan 53-201 Illustrating Increase in Vibration at 50 – 60 Hz.**



**Plot of Variable Frequency Testing on Fan 53-202 Illustrating Increase in Vibration at 50 – 60 Hz.**

