



# UTTER PRECISION, INC.

*The Next Generation in Reliability*

Utter Precision, Inc.

PO Box 337 • Utica, NE 68456-0337 • Phone/Fax 402-534-3513 • Mobile 402-641-7737 • Email [info@utterprecision.com](mailto:info@utterprecision.com)

November 11, 2007

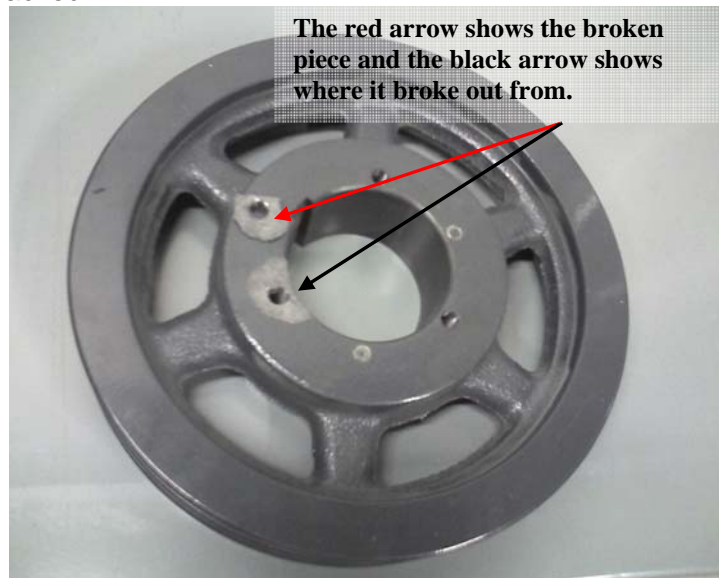
ABC Company  
Attn: Maintenance Supervisor  
123 Hwy 60  
Our Town, NE 68123

Subject: AHU-11 Air Handler Laser Sheave Alignment

Dear Mr.Man:

On November 11, 2007, I was at your location to perform a Laser Sheave Alignment on the AHU-11 Air Handler.

The sheaves had considerable offset misalignment. During the removal of the sheave hub to adjust the offset alignment, cracked and broken bolt holes were found. The picture below shows where the sheave bolt hole was cracked.



The new sheave was put on and found to have 5 mil axial run out issue. Discussions determined that this condition was acceptable for this machine.

The alignment was completed and brought within the excellent range. The Belt Tension was set in accordance with the fan nameplate. Images on the next page show the alignment results.



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## Post Alignment Results

**Fan Sheave Alignment**



**Motor Sheave Alignment**



**Motor Sheave Alignment in area with 5 mil runout**



Ultrasonic, vibration, and infrared readings were taken prior to and after completion of the alignment to check machine condition. Initial indications of ticking noise on the drive end fan bearing. Ultrasonic and vibration analysis confirmed bearing wear. The unit was also checked for severity of heating with infrared and the overall condition of the machine with vibration.

### Vibration Findings

Since trending was not available, the ISO 10816 Standard for vibration standard was used to determine vibration severity. The graph below shows the **ACCEPTABLE, UNLIMITED LONG TERM OPERATION ALLOWED, SHORT TERM ALLOWABLE OPERATION**, and **DAMAGE CAUSING** levels with their corresponding ISO class. This unit is considered a Group 2 flexible piece of equipment as shown in the chart below. The fan showed misalignment with both the vibration and alignment data. The bearing wear is in approximate mid-stage 1 of the bearing failure cycle and

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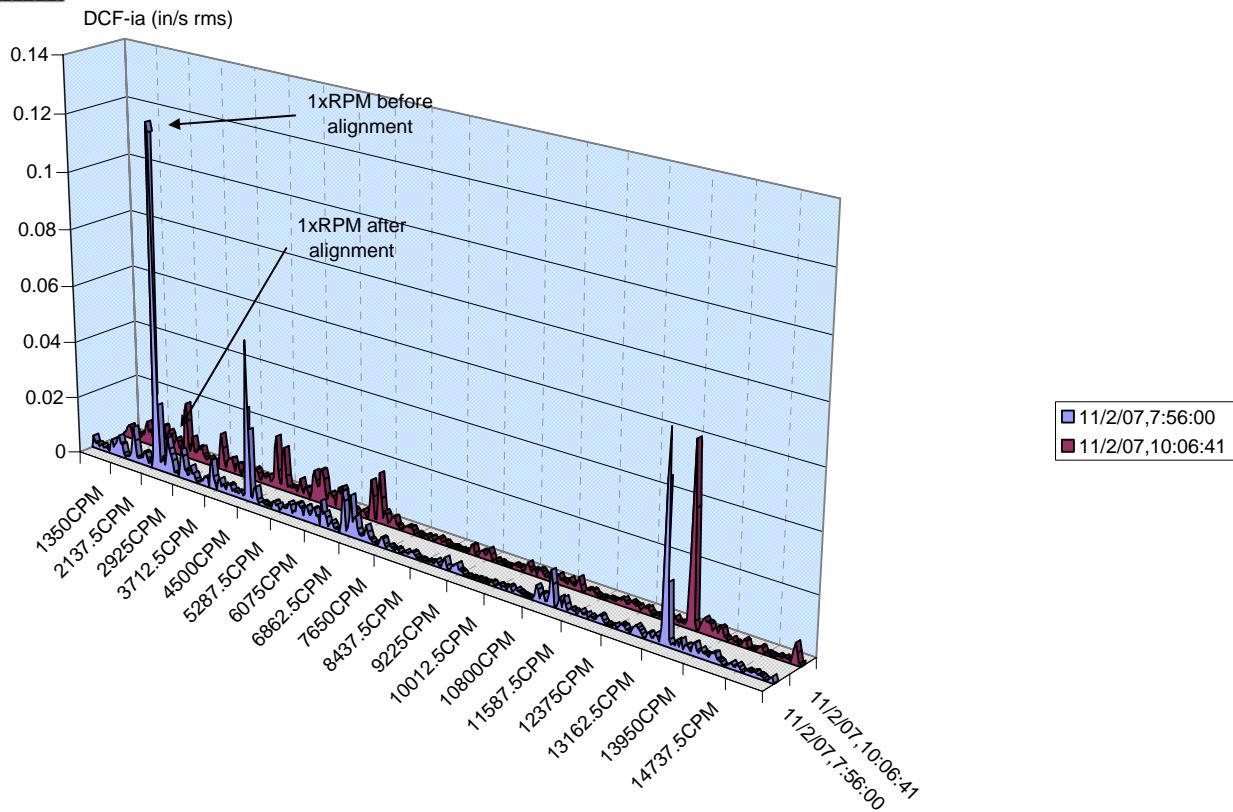
vibration indicates **Short Term Use Allowable** use without damage to the bearings. Vibration taken after the alignment indicated the reduction of 43% in the vibration levels. This could not be reduced further due to the severity of the bearing condition.

Generally it is recommended that bearing be changed when an alignment is performed so that the equipment is placed in the best condition possible. Due to the time limitation for the alignment, this could not be done so further monitoring should be done to determine the most advantageous time to replace the bearings.

Figure 1 shows the before and after misalignment found.



Waterfall Graph of Air Handler DCF-ia





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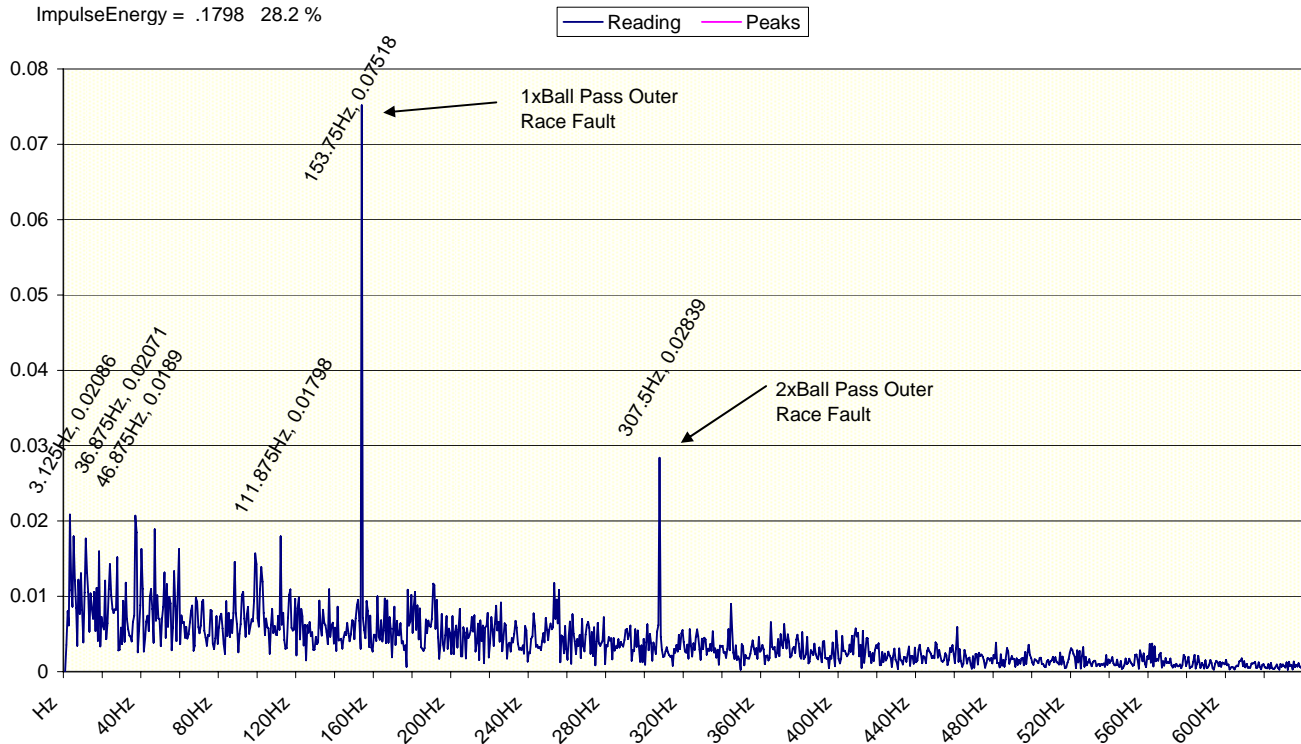
Figure 2 shows the bearing faults present.



DCF-ivw (g)  
Demodulation

ImpulseEnergy = .1798 28.2 %

**Demodulation**  
**Air Handler**  
**DCF-ivwW 11/2/07,7:54:47**



## Infrared Findings

See the report pages following this of the before and after infrared.

## Cost Analysis

Also see the attached cost analysis showing the value of the service.

Thank You for the opportunity to serve you with this alignment service. We look forward to working with you more to improve your overall equipment reliability.

OJ Utter  
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