



Field Services Report:

Vibration Analysis of Carrier Chiller

Abstract

This unit had been reworked and I was asked to monitor and analyze the vibration of the Carrier chiller during startup. The maximum vibration recorded after start up was 0.137 inches per second (ips) at a frequency of 7200 cycles per minute (cpm). The data was recorded from location 6 in the horizontal direction. The vibration levels measured are classified as FAIR.

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Scope

To monitor and analyze the vibration of the Carrier chiller in area 141-B.

Background

Personnel had replaced the compressor and gearbox of the train. The offset alignment was done by Factory personnel.

Machine Configuration

Foundation Type: Concrete /Structural Steel

Compressor Type: Centrifugal

Compressor Speed: 7200 rpm

Gearbox Type: Single reduction

Gearbox Ratio: 4:1

Motor Speed: 1800 rpm

Motor Horsepower: 900 hp

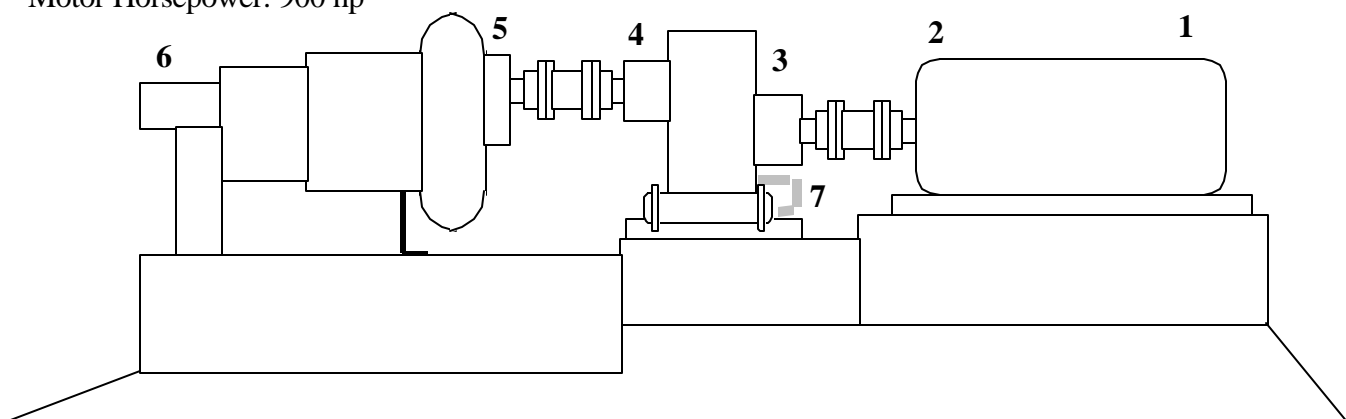


Figure 1: Machine Configuration

Procedure

Vibration data was collected at 08:45 on 01/22/97. Factory personnel stated the compressor was operating under no load.

Vibration data was collected at 08:00 and 09:00 on 01/23/97. Plant personnel stated the motor current draw was 85 amps. Factory personnel stated the compressor was pumping liquid during the 08:00 data collection and was not pumping liquid during the 09:00 data collection.

Vibration data was collected at 08:00 on 01/24/97. Plant personnel stated the motor current draw was 145 amps.

Vibration data was collected on the gearbox lube oil piping.

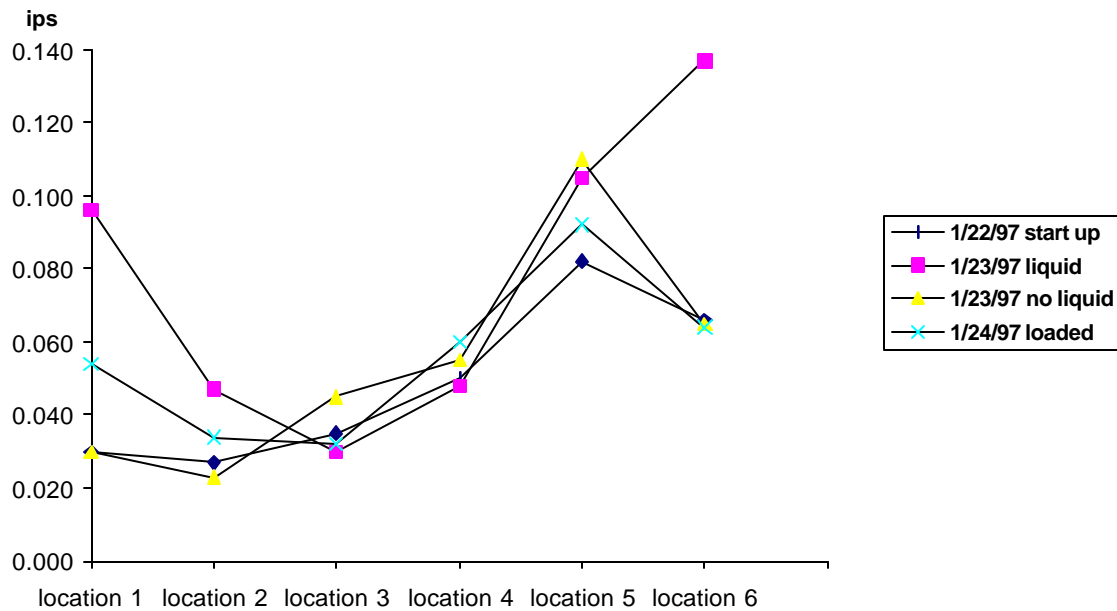
Results

Maximum values at each location and there frequencies are shown in the table below (see table 1).

Table 1: Maximum Vibration Levels Recorded

DATE	POSITION	AMPLITUDE	FREQUENCY
01/22/97 start up	5 vertical	0.082 ips	7275 cpm
01/23/97 liquid	6 horizontal	0.137 ips	7200 cpm
01/23/97 no liquid	5 vertical	0.110 ips	7200 cpm
01/24/97 loaded	5 vertical	0.092 ips	7200 cpm

The maximum vibration recorded for each day at each location is plotted in the graph below (see graph 1).



Graph 1: Maximum Vibration Trend

The maximum vibration recorded on the gear box lube oil piping was 0.876 ips at a frequency of 7200 cpm. The vibration measurements were recorded from location 7 in the horizontal direction.

Conclusions

The maximum vibration recorded from the compressor train bearings on 01/24/97 was 0.092 ips at a frequency of 7200 cpm and is classified as FAIR.

The highest vibration recorded was from the compressor this is probably due to some residual misalignment.

Vibration was observed on the lube oil piping of the gearbox this is contributing to the overall vibration.

Recommendations

The machine should be monitored on a routine basis as part of a regular predictive maintenance program.

The thermal growth and movement due to mechanical loading should be measured.

The compressor train should be offset aligned using the information from the thermal growth and mechanical movement measurements.

The vibration from the lube oil piping should be reduced. YOR personnel stated the pressure relief valve was possibly causing the vibration.