

## Ground vibration measurement near Sr.VP office area

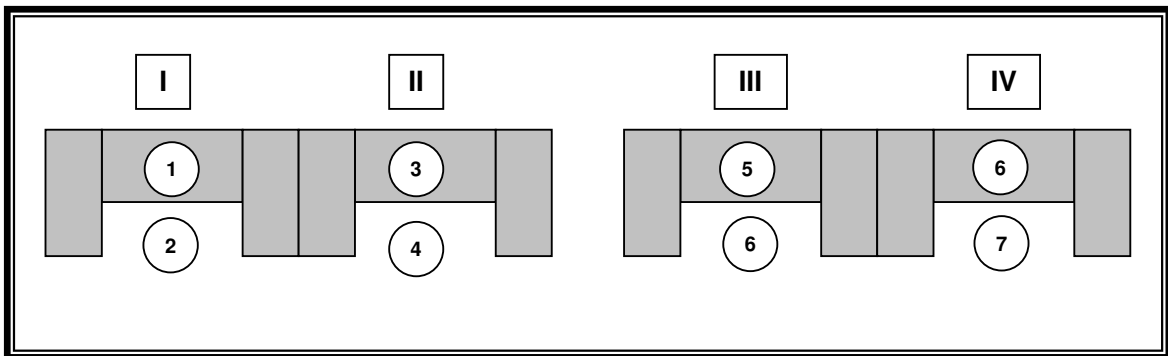
### History:

Customer complains that all the executives sitting in and around Sr.Vice President's office were feeling vibrations on the table as well as on the floor.

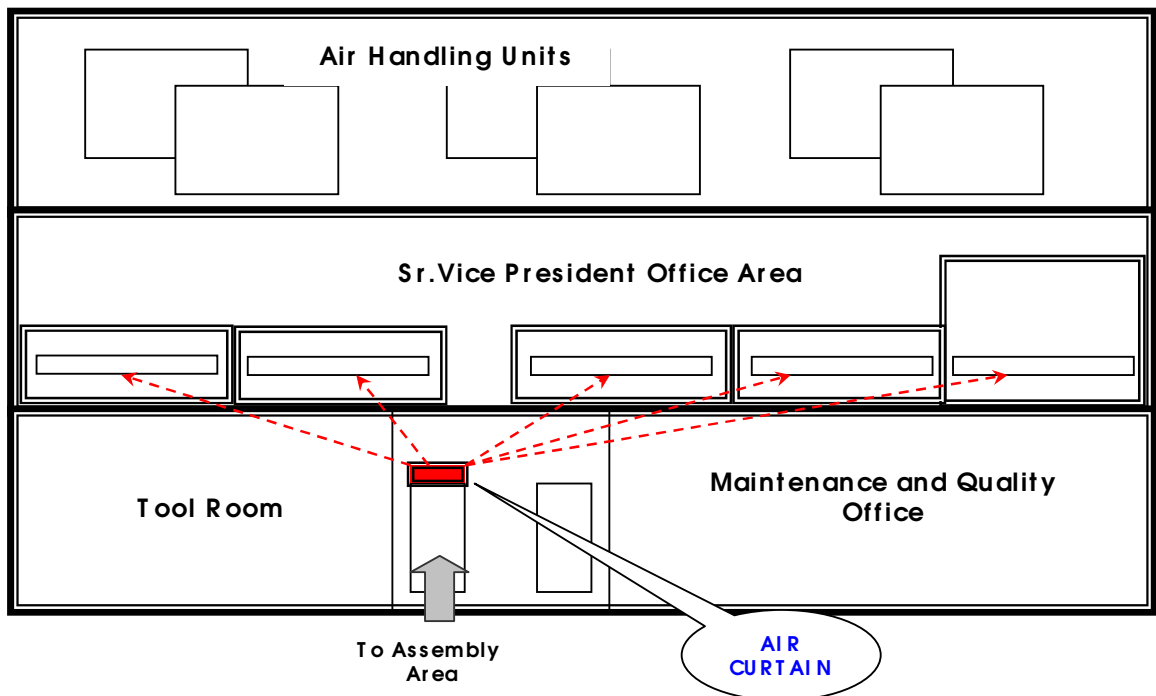
### Ground Vibration Measurement at office area:

Vibration measurement (velocity vibration in mm/sec) was carried out at selected locations on the identified floor area and cubical tables (Refer layout) in different directions. All the measured data are Fourier analysed to get the frequency spectrum. Table-1 shows the vibration levels at various locations.

### Floor Layout at 1<sup>st</sup> floor office (Top View): -



### Layout of the building (Front sectional View): -



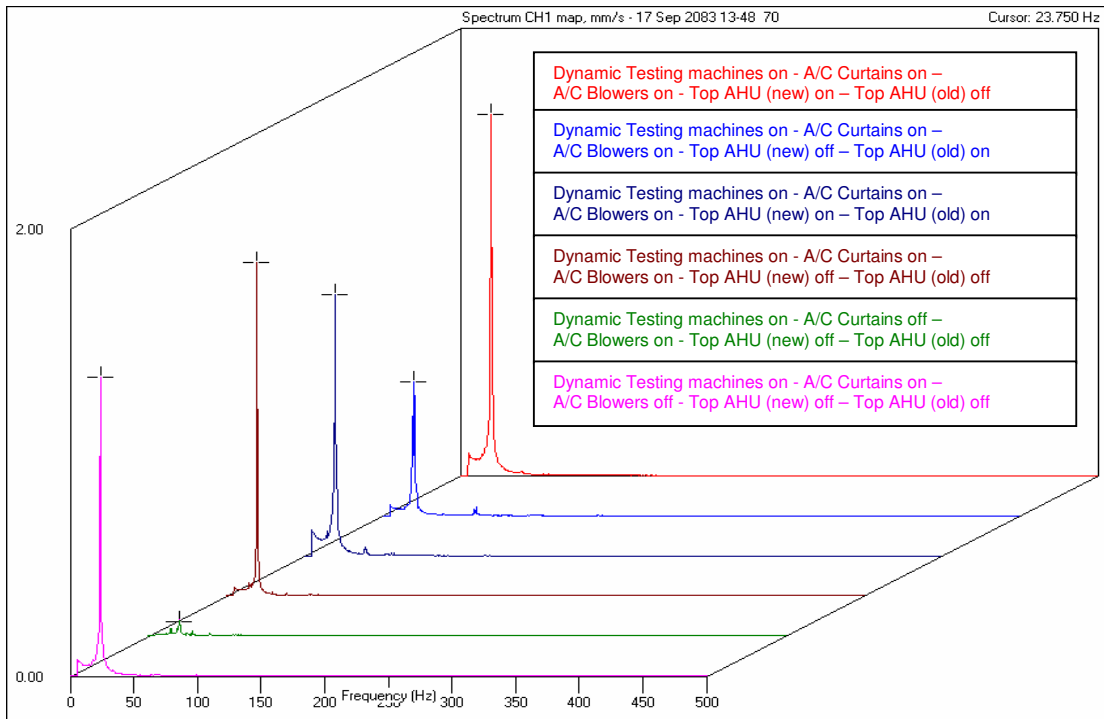
**Table-1 Vibration levels in velocity at various locations**  
**(With A/C curtains in 'ON' condition & top AHU fans in 'OFF' condition)**

Meas. Point No's.	Vibration severity level in mm/sec (rms.)		
	Measurement Direction		
	X	Y	Z
Location 1	0.94	1.02	0.98
Location 2	0.08	0.09	0.08
Location 3	1.18	1.21	1.16
Location 4	0.17	0.19	0.13
<b>Location 5</b>	<b>1.23</b>	<b>1.61</b>	<b>1.34</b>
<b>Location 6</b>	<b>0.17</b>	<b>0.31</b>	<b>0.15</b>
Location 7	1.10	1.32	1.26
Location 8	0.09	0.10	0.08

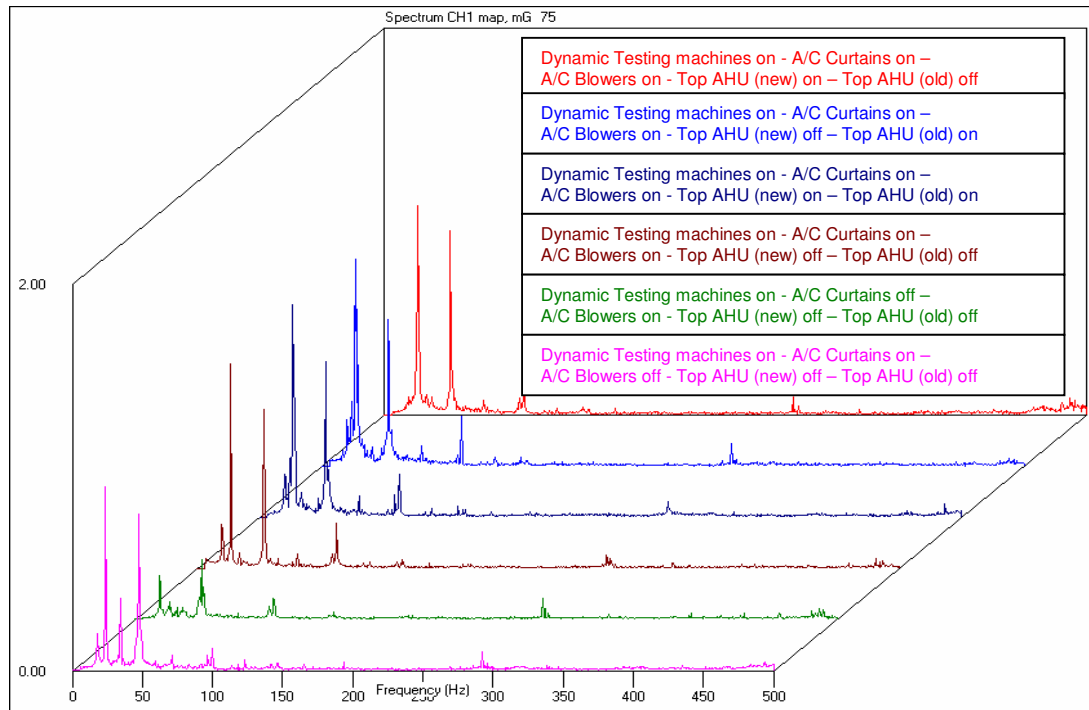
**Measurement:**

- The ground vibration measurement was done using DI 2200 FFT vibration analyser and the low frequency high sensitivity accelerometer at selected locations in the office area.
- The measurement was carried out initially by switching off all the top AHU's (6 no's) which was located in the 2<sup>nd</sup> floor of the building and the frequency spectrums were observed
- It was evident from the measurement that the vibration levels were alarming at location 5 and 6 compared to all the other areas.
- So a more detailed measurement and spectrum analysis was done at the above said locations by applying certain conditions like taking the measurement by switching off and on certain machines which were located in the ground floor (refer spectrum # 1 and 2)
- It was observed from the measurement that a frequency component at 23.8 Hz was predominant (with high vibration value of 1.56 mm/sec) in the spectrum compared to all the other frequency peaks
- Also it was observed that when the A/C curtain fan provided on the output side of the assembly room was switched off there were no vibrations felt at locations 5 and 6.
- When the vibration measurement was taken on this A/C curtain fan it was found that at 23.8 Hz (running frequency of this fan) was showing as high as 18 mm/sec (refer spectrum no. # 3) which is an unbalanced induced vibration and its related harmonics. Also the vibration was very much felt on the walls adjacent to this fan.
- It was observed from the measurement that the vibration levels were increased to 1.91 mm/sec from 1.61 mm/sec at the above said locations when all the 6 top AHU fans were switched on.

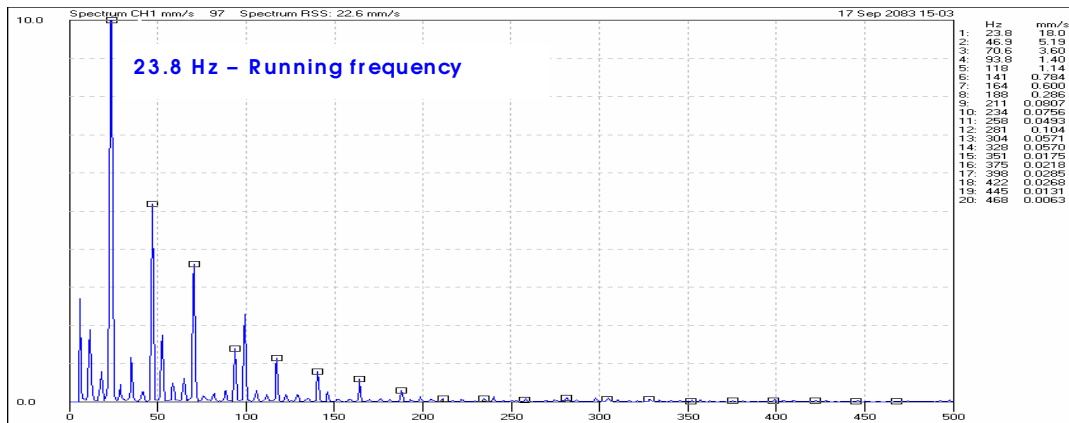
**Spectrum # 1, Measurement Location # 5 (cubical No. 3) – on the table**



**Spectrum # 2, Measurement Location # 6 (cubical No. 3) – on the floor**



### Spectrum # 3, Measurement Location on A/C curtain fan



#### **Conclusive Remarks:**

- It is evident from the measurement that the vibration levels on the Cubical tables and on the floor in the 1<sup>st</sup> floor office are more than the permissible limits (vibration levels should be less than 0.1 mm/sec on the floor)
- The A/C curtain provided on the output side of the assembly hall is giving high vibrations which is getting transmitted to the adjacent walls and then to the 1<sup>st</sup> floor office. This needs to be cleaned on regular basis and dust getting accumulated on this fan should be controlled.
- All the 6 top AHU fans are also having high vibrations and are contributing for increasing in vibration levels in the office area. These fans need immediate attention.
- The above corrective actions has to be taken at the earliest else in a long run these vibrations may have some adverse effect on the building structure.

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