A V TECHNOLOGY LIMITED

Machines Talk,
And It Pays to
LISTEN.

Case History No.9

IN-SITU BALANCE OF A OVERHUNG FAN

Imbalance exists to some degree in all machines, and is characterised by vibration at a frequency of once per revolution. In the absence of high resolution analysis equipment, imbalance is usually first to get the blame for excessive once per revolution vibration. A state of imbalance occurs when the centre of mass of a rotating system does not coincide with the centre of rotation.
Imbalance can be caused by a number of things including incorrect assembly, material build-up, rotor sag, thermal growth and component loss.

This case history shows how in-situ balance correction can be performed without the need of a costly machine outage.
Vibration data collected from the motor of an overhung fan assembly indicated the worst recorded once per revolution vibration to be at the motor drive end horizontal direction with an amplitude of 30 mm/s rms as shown in Figure 1.

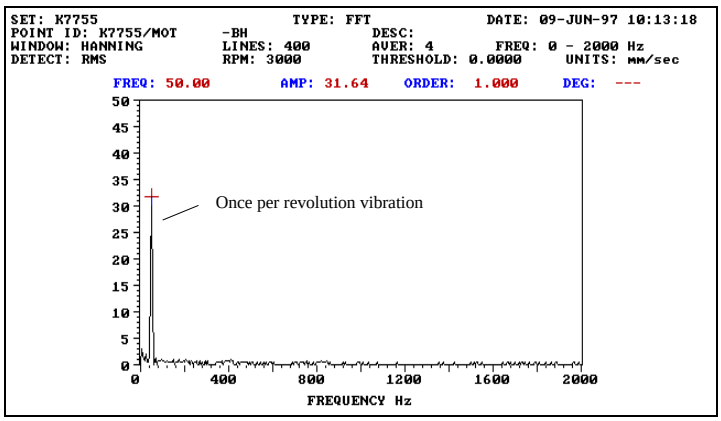
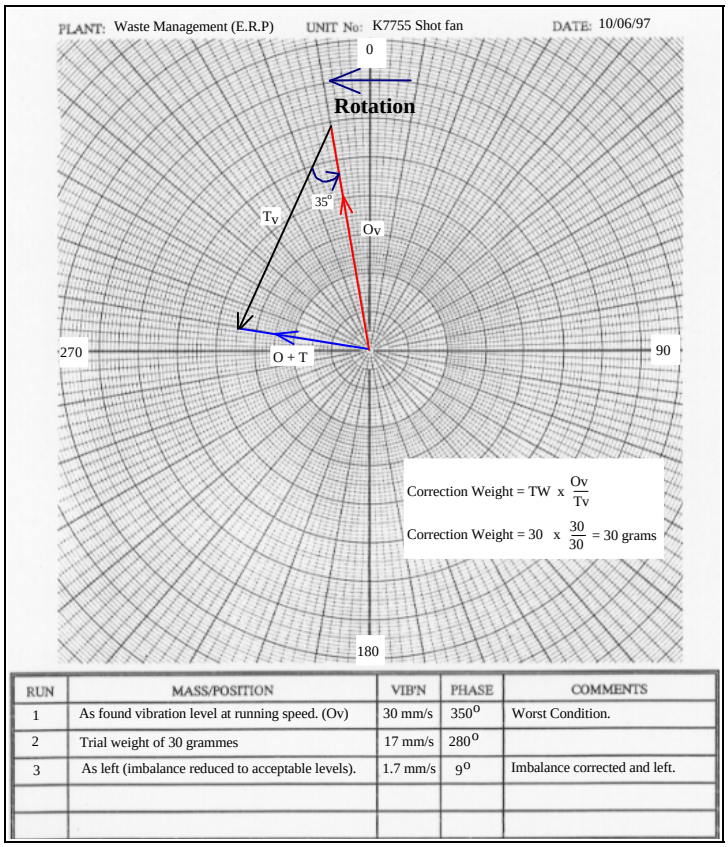


Figure 1 - High once per revolution vibration.

The amplitude of the once per revolution vibration, along with its angular position from a known reference, was plotted on a vector chart as 'O_V'. The machine was brought to rest and a mass of 30 grams added to the outer radius of the fan at an arbitrary position. The machine was brought up to speed and the new amplitude and phase angle of the once per revolution vibration plotted on the vector chart as 'O+T'. From these two vectors we could determine the vector change caused by the trial weight, this was plotted on the vector chart as 'T_V'. From these values the mass of the correction weight was calculated and its angular position from the trial weight found, see Figure 2.

The correction weight required was 30 grams and would have to be positioned 35° from the trial weight position in the direction of the machines rotation . Once the correction weight was fitted, the trial weight was removed and the machine run up to full speed.



RUN	MASS/POSITION	VIB'N	PHASE	COMMENTS
1	As found vibration level at running speed. (Ov)	30 mm/s	350°	Worst Condition.
2	Trial weight of 30 grammes	17 mm/s	280°	
3	As left (imbalance reduced to acceptable levels).	1.7 mm/s	9°	Imbalance corrected and left.

Figure 2 - Vector chart indicating vibration levels and phase.

Vibration data recorded indicated that the source of the imbalance had been correctly located and corrected as depicted in Figure 3.

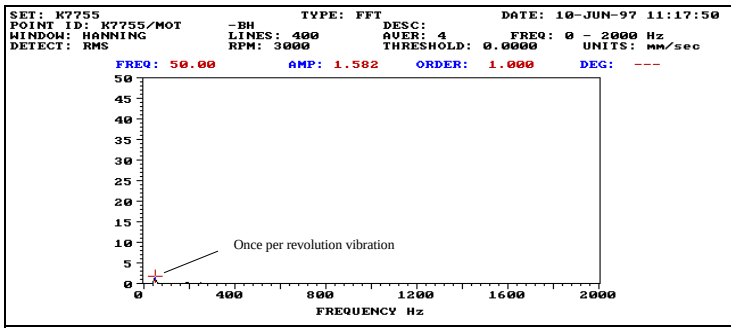


Figure 3 - Imbalance reduced to 1.6 mm/s rms

In the event of machine failure it was estimated that repair costs would be **£700** with losses to production potentially being many hundreds of pounds.

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