

Vibration measurement and diagnosis of valve seat generating machine

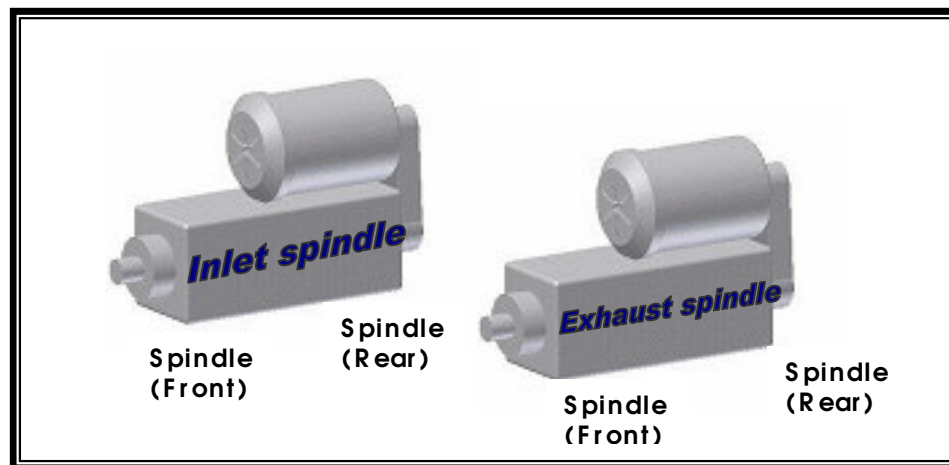
History: Customer complains of inaccuracies on the job/ component and high vibrations on the spindle unit assembly

Measurement:

Vibration measurement was carried on both inlet & exhaust spindle units during idle running condition. Following are the measurement points on which vibration measurements/analysis were carried out

- Inlet Spindle (Front) & (Rear)
- Inlet Spindle draw bar bearing block
- Exhaust Spindle (Front) & (Rear)
- Exhaust Spindle draw bar bearing block

All the data were FFT analysed to get the frequency spectrum. Measurement carried out at normal operating conditions both at **low speed (1300 rpm) & high speed (2600 rpm)**. Measurement was carried out at different bandwidths i.e at low frequency bandwidth (0 Hz to 1kHz) & at high frequency bandwidth (0 Hz to 10kHz). Table-1 shows the vibration severity level at different bandwidths (0 to 10kHz)



Machine Block Diagram

Table-1 Vibration levels (mm/sec rms.) at various locations

Meas. Point	Speed	1 st band	2 nd band	3 rd band	4 th band	Overall
Inlet Spindle (Front)	1300	0.237	0.182	0.105	0.418	0.525
	2600	0.728	0.317	0.218	1.686	1.876
Inlet Spindle (Rear)	1300	0.260	0.136	0.112	0.220	0.384
	2600	0.491	0.326	0.196	0.908	1.098
Exhaust spindle (Front)	1300	0.314	0.395	0.059	0.177	0.538
	2600	2.793	0.621	0.185	0.549	2.919
Exhaust spindle (Rear)	2600	2.517	0.394	0.509	0.155	2.597

Conclusive Remarks:

- From the measurement & Analysis it was evident that the vibration levels at bearing fault (high frequency 4th band) were very high for both exhaust & inlet spindles.
- It was also evident from the measurement on the spindle that there were remarkable vibrations in all bands for both inlet & exhaust spindles and also side bands with a width of rotational frequency, which indicates bearing deterioration in both spindles.
- From the spectrum analysis it was suspected that the front & rear end bearings in both inlet & exhaust spindles were under deterioration.
- Spindle bearing no. being RHP 7018, bearing fault frequencies were calculated and were correlated with available data. It was seen that bearing fault frequency BPF1 488 Hz was matching with the measured spectrum (Refer Fig-1) also vibration level for that particular frequency was more with harmonics & side bands and concluded as "Bearing is under deterioration".
- It was suggested to replace the bearings of both the spindles

Fig-1 Vibration Spectrum: Inlet Spindle (Front)

