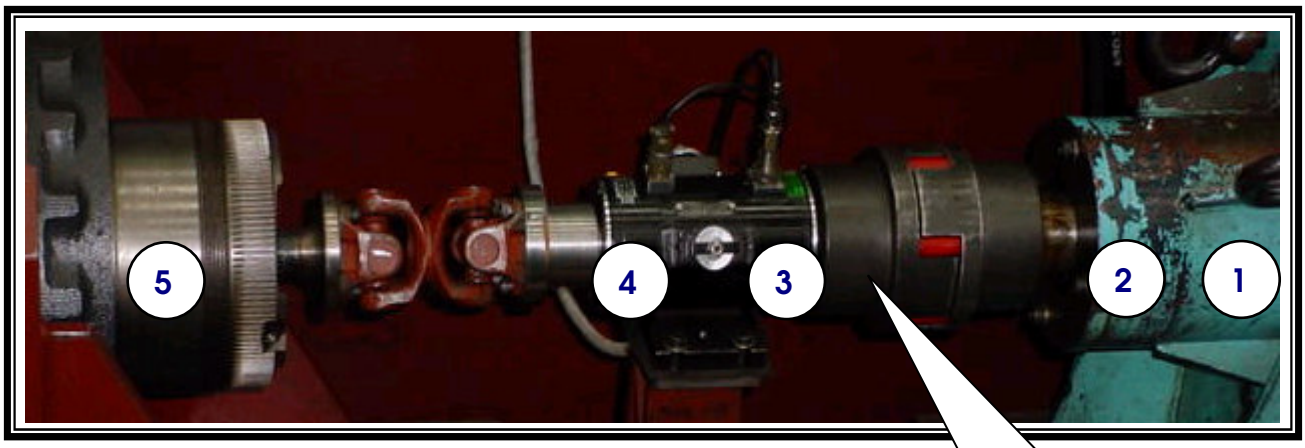
Task: Vibration Measurement and Dynamic Balancing of Hydraulic Motor Test bench:

History:

- Customer complains high vibrations on the motor test bench

Vibration Measurement and Dynamic Balancing

- Initial vibration readings and frequency spectrums were taken at all the 5 locations at 2200 rpm.
- Run up measurement was taken starting from 500 rpm upto 2200 rpm and their respective vibration levels were noted at location 3 before balancing.
- Initial vibration readings were very high and alarming at locations 2 and 3.
- In-situ balancing was done at 2200 rpm and the correction in terms of mass addition was done on the coupling side.
- Run up measurement was again taken starting from 500 rpm upto 2200 rpm and their respective vibration levels were noted at location 3 after balancing
- Table-1 depicts the vibration severity levels before and after balancing
- Fig-1 shows the graphical display of vibration levels at various speeds before and after balancing
- Fig-2 to Fig-5 shows the comparative vibration spectrums before and after balancing

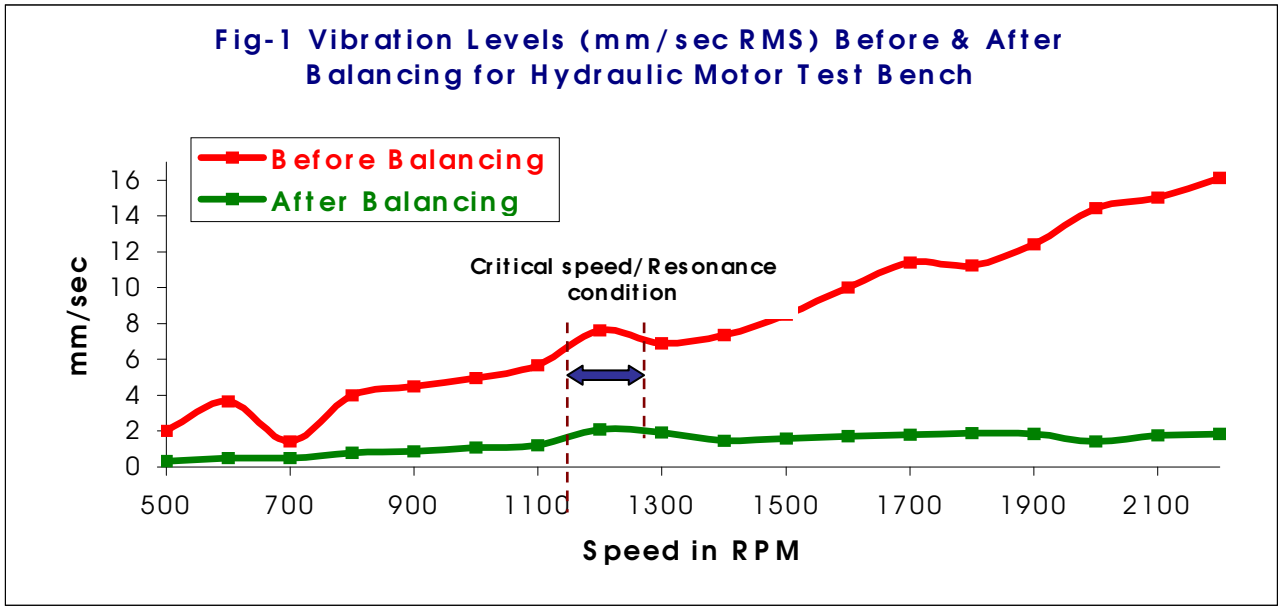


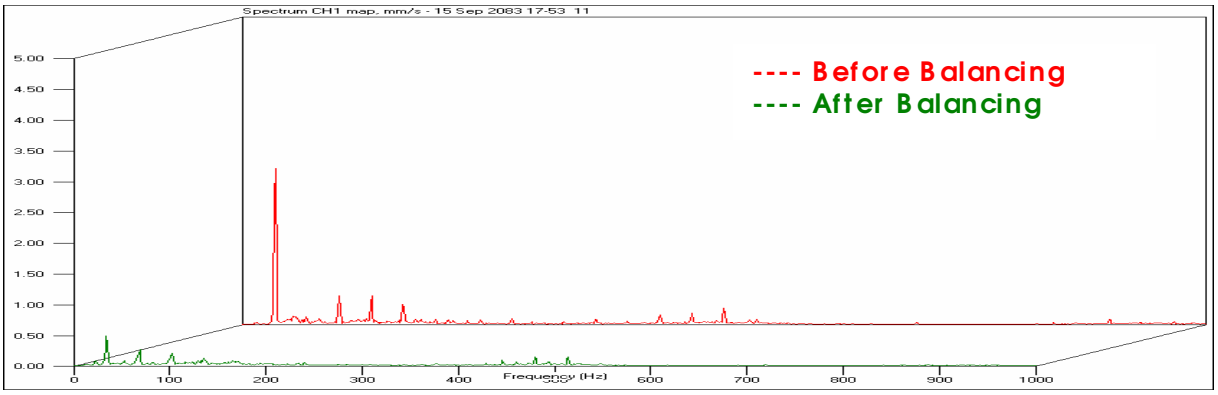
MACHINE BLOCK DIAGRAM

(*) - Measurement Location

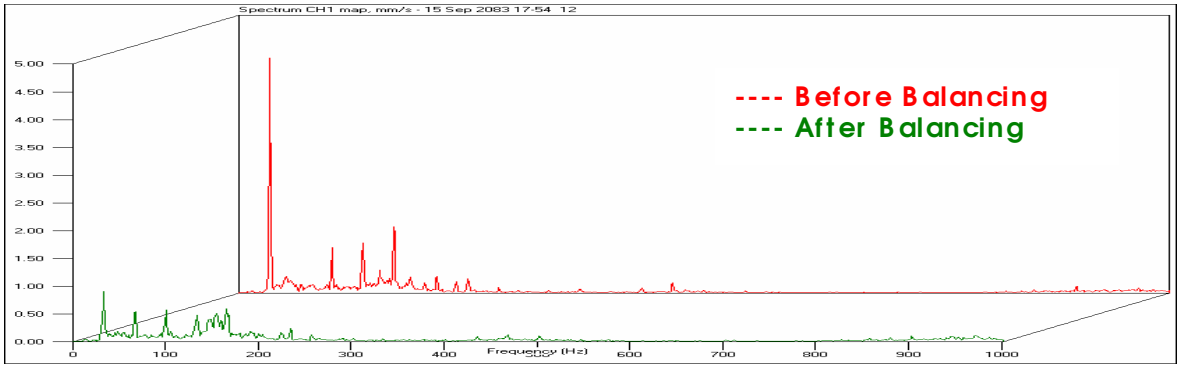
Table-1 Vibration severity levels before and after balancing of Hydraulic Motor Test Bench

Measurement Point	Speed in rpm	Vibration severity level in mm/sec (rms.)		Correction in gm-mm
		Before Balancing	After Balancing	
		At 1 x rpm	At 1 x rpm	
Location # 2	2200	6.45	0.45	2100
Location # 3		16.13	1.85	5250

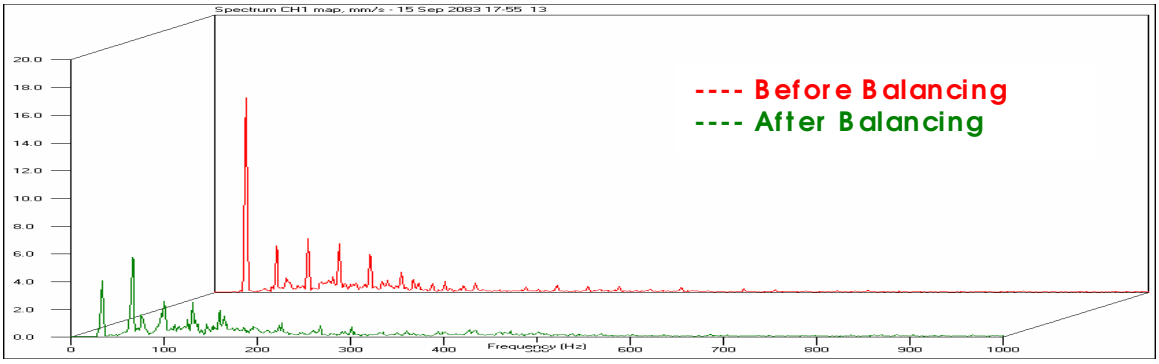




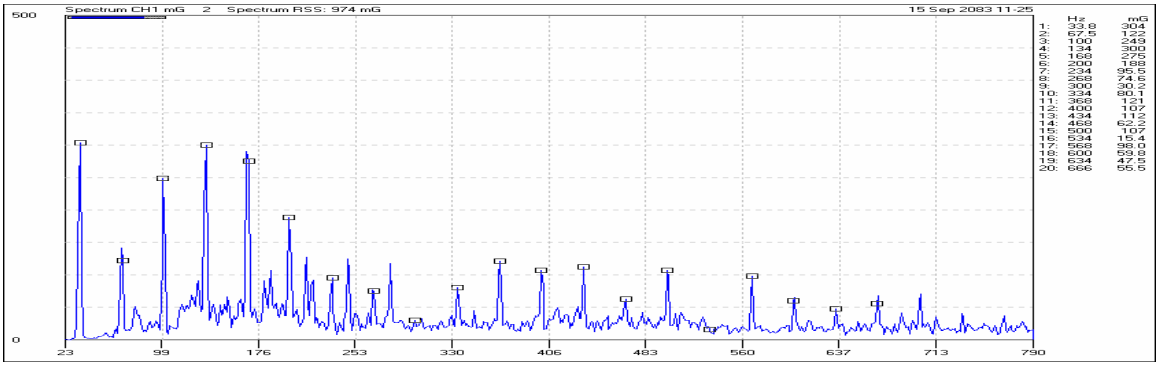
Location # 1, (Fig-2)



Location # 2, (Fig-3)



Location # 3, (Fig-4)



Low frequency spectrum taken at location # 3, (Fig-5)

Conclusive Remarks:

- It was observed from the measurement that there is a resonance condition at around 1200 rpm where the natural frequency of the system is matching with the running frequency of the unit and the vibration levels are reaching the alarm limits. Hence it is suggested not to run the test bench at the above-mentioned speed.
- The entire test bench is mounted on a hollow frame structure, which is very weak in nature and no foundation bolts are provided. Hence it is not in a position to damp the vibrations at high speed (2200 rpm). Therefore it is suggested to make the system more rigid and stiff by doing proper grouting and providing antivibration pads at the base.
- Check for any rotating looseness/foundation bolts looseness as the running frequency harmonics are observed in the low frequency spectrum at location# 3 (Refer Fig-5)

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