

# Design, Manufacturing and Vibration Analysis of Defects in Spur Gear Box

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**Abstract:** Gears are important element in a variety of industrial applications such as machine tool and gearboxes. An unexpected failure of the gear may cause significant economic losses. For that reason, fault diagnosis in gears has been the subject of intensive research. Vibration signal analysis has been widely used in the fault detection of rotation machinery. The vibration signal of a gearbox carries the signature of the fault in the gears, and early fault detection of the gearbox is possible by analysing the vibration signal using different signal processing techniques. In this dissertation vibration analysis of spur gear box is done by FEA and experimental method. Design of spur gear box is done on basis of given working parameters using SI units and design data book and same design parameters are used for fabrication. During initial phase of project process capability analysis is done on existing gear box. Further analysis is done by inducing defects such as decrease in height of gear tooth and crack at tooth base. Their performances were checked on basis of noise analysis. An attempt is made to decrease the stresses in gear tooth by inducing cavities of various shapes at various locations using FEA. The performance of gear box is tested at 0kg, 3kg, 6kg, 9kg and speed for 1400 rpm. Frequency measurement at working loading condition is performed using FFT analyser. Natural frequencies at different loading condition are determined by using FFT analyser. The experimental results obtained by above testing are validated with finite element analysis and the results found satisfactory and within the range.

**Keywords:** Vibration, Fault Diagnosis, Condition Monitoring, Gearbox, etc.

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