IJARSCT





International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 3, June 2025



Detection of Gear Tooth Defects by Using FEA Technique and ANSYS

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Abstract: In gearboxes, load fluctuations on the gearbox and gear defects are two major sources of vibration. Further, at times, measurement of vibration in the gearbox is not easy because of the inaccessibility in mounting the vibration transducers. Vibration analysis techniques are used for detection of fault in gear system, fluctuation in gear load such as a method for monitoring the evolution of gear faults based on the newly developed time- frequency analysis through FEA, in which analysis is carried out with the decomposed current signal to trace the sidebands of the high frequencies of vibration,. It is also helpful tool for health monitoring of gears. Acoustic signal can be used effectively along vibration signal to detect the various local faults in gearboxes using the wavelet transform technique. Two commonly encountered local faults, tooth breakage and tooth crack were simulated. In fault simulating, two very similar models of worn gear have been considered with partial difference for evaluating the preciseness of the proposed algorithm. Moreover, the processing of vibration signals has become much more difficult because a full-of-oil complex gearbox system has been considered to record raw vibration signals. Raw vibration signals were segmented into the signals recorded during one complete revolution of the input shaft using tachometer information and then synchronized using piecewise cubic hermit interpolation to construct the sample signals with the same length

Keywords: Gear Defects, Vibration Analysis, Finite Element Analysis, Acoustic Signal, Tooth Breakage, Raw Vibration Signals

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DOI: 10.48175/568



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