


Sl No	Particulars		
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3	PhD Thesis Title	Monitoring the Performance of Spindle Bearings of a Lathe using Multisensory Approach by FEM, Multiple Regression & GMDH.	
4	Research guide Name	Dr. H. V. Ravindra	
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5	Date of Registration for PhD	01.03.2005	
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6	Date of Award of PhD degree	29.07.2011	
7	<p><u>Brief synopsis:</u> In modern manufacturing environments, machinery failures are predictable. Condition monitoring identifies the characteristic changes of a process based on evaluation of signatures without interrupting the normal operations. Lathe is one of the most versatile and complex machine tools used for producing parts of different shapes with desired precision. By placing the sensors at various locations on the lathe structure, it is possible to extract more information about the health of the machinery. Quality of the finished products depends mainly on stability and rigidity of different elements of lathe. Vibration can be caused by a variety of factors which include unbalance, misalignment, looseness of parts, and wear of elements. Among the machine elements, bearings and gears contribute to the dynamics of machine-drives. The presence of unbalance forces and any defect in spindle bearing of lathe tool structure may induce vibration, which can ultimately impair dimensional accuracy. The broad area of research work involves performance study of spindle bearing of a lathe tool structure using FEM, Multiple Regression and GMDH. Here the lathe structure was modeled using finite element software with suitable elements. Modal analysis was performed to know the mode shapes and natural frequencies. Harmonic analysis was done to study the effect of unbalance forces on the structure. Transient response analysis was carried out to study the vibration of the spindle bearing due to induced defect on the inner race of a spindle bearing and on the gear tooth. The experimental analysis on the same lathe was done to determine the parameters such as vibration, Temperature, shock pulse, Acoustic emission signals for various cutting conditions. The lathe structure was analyzed experimentally. Finally the theoretical (FEA) and experimental results were compared. Further, by selecting the various independent parameters measured, the dependent parameter like the vibration and the AE signals were estimated using the tools such as multiple regression analysis and Group Method of Data Handling (GMDH).</p>		