DESIGNING AND DEVELOPMENT OF A DYNAMIC VIBRATION BALANCING MACHINE FOR INDUSTRIAL APPLICATIONS

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ABSTRACT

There is a steadily growing demand for reliable, versatile measurement rotor balancing system which can be used to determine the machine unbalances behavior. The effect of these causes are the increase of vibration amplitudes, causing damage to elements of the machines, mainly in the bearings, reduce useful life time, and increase fatigue failure in machines. The industry requires that machines have to operate continuously, efficient maintenance philosophy, and reduce down time. Therefore, this research work has the main objective to design and develop a low cost rotor balancing measurement system for industrial applications. This research study was based on the ISO 1940-1 standard. The Solidworks software was used for the designing, structural stress, and modal analysis. It was also carried out and extensive numerical analysis with Finite Element Method (FEM), of the developed measurement system, in order to identify the structure resonance frequencies to avoid with the induction motor rotation frequency. For the simplicity, precision and robustness, the single plane four runs method for rotor balancing was selected. Finally, it was developed a rotor balancing measurement system. It showed the ability, and potential to use the developed equipment in industrial environment. Moreover, it has been shown that the measurement and the applied analysis method have worked accurate for unbalance detection and reduction of vibration levels from G13 to G2.

Keywords: Rotor, Balancing, Vibration analysis, Solidworks, FEM, Modal Analysis, ISO 1940-1.

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