ABSTRACT

Air management is needed to create a comfortable environment in the industrial world. The air management tool in the form of a fan is a mechanical device that can manage air and produce large friction forces. Minimizing the frictional force requires components such as bearings. Damaging the bearing will disrupt the performance of the fan. Conventional methods such as visual and sound observation cannot detect the bearing properly when the bearing is operating. Therefore, this study used a vibration-based method which was Support Vector Machine (SVM) to detect damage to the bearing. The purpose of this study was to produce a method of detecting defects in single row bearing outer race bearings on industrial fans using SVM.

The study was conducted using industrial fan prototypes. The bearing recorded were single row type bearings under normal conditions and which were deformed as deep as 1.4 mm on the outer race. Recording uses data acquisition with a sampling speed of 17066 hz at a motor rotational speed of 2850 rpm. SVM classification is done with 17 statistical parameters using MATLAB r2018a software.

The result of this research indicated that good statistical parameters used from the 17 parameters modeling as SVM classification input were Root Mean Square, Standard Deviation, Kurtosis, Variance, Entropy, Standard Error, Median, Signal to Noise and Distrortion Ratio, and Signal to Noise Ratio. The most optimal SVM model was obtained by applying a combination of Median statistical parameters with SINAD, with the same testing accuracy in the RBF, Polynomial and Linear kernels by 100%. This study concluded that the classification of defects in the outer race ball bearings on industrial fans could be done by applying the Support Vector Machine (SVM) method.

Keywords ; Outer race defects, Bearing detection, Vibration-based methods, Statistical parameters, Support Vector Machine,