**Abstract**

Induction motors are the most common motors used in industrial field because of their cheap price, high reliability and low maintenance cost. However, the induction motors like other motors, can be exposed to different faults. These faults may occur due to operating conditions or defects in industry or any other reason. So it became necessary to establish and develop a monitoring system which is suitable, efficient and able to detect faults in the early stages in order to reduce work and cost of maintenance and non-programmed stop intervals.

This research presents a complete design and implementation of the system in order to monitor the status of three-phase induction motor. It was built using a Labview program and two types of sensors (current, vibration) to detect some of the mechanical and electrical faults that occur in the motor. The study and examination of several types of faults including (bearing fault, shaft misalignment faults, broken rotor bars, and unbalance of voltage supply faults), have been done through the extraction of fault data by using fast Fourier transform (FFT) technique. The results showed that, motor current signature analysis (MCSA) technique is a technique used in a wide range, also it is the best technology in the detection, of the large number of mechanical and electrical faults. The results of vibration monitoring technique also showed the possibility of the diagnosis of the motor case by measuring and monitoring the root mean square (RMS) value, and comparing it with the standards in the table of (International Organization for Standardization) ISO. In addition, the results showed that choosing the location and direction sensor has an important role in determining the type of fault since some faults appear in a certain direction of the sensor, but they do not appear in the other direction.

The research showed that the use of artificial neural network (ANN) helps in the detection and diagnosis of motor faults at high speed and high accuracy reached to 94% of accuracy. The use of artificial neural network (ANN) is able to detect the compound faults at the same time. Also, the artificial neural network (ANN) that has been used, does not need to enter fault data by hand as well as it does not need to insert many equations for detection and diagnoses fault.