# Abstract

The present work has been done into two parts, fault detection and diagnosis, and the areo-thermodynamic investigations of gas turbine .

The Process faults can be detected by two mechanisms, alarm and isolation methods. A potential solution to this problem is the use of neural network methodology. The fault detection and diagnosis model for bearing system of gas turbine is developed utilizing the MATLAB software.

In this work, the second unit of south of Baghdad power station is chosen as a case study for engine monitoring. Data of (temperature, pressure at inlet and outlet of compressor and turbine, vibration parameter in x and y axis and compressor casing vibration) are taken for normal operation. Sets of readings are called plant data are taken every two hour. These are compared with the fault reading to locate any sign of faults.

The standard vibration parameters limit, which given by the company manufacturing of gas turbine unit are 15mm/s for over vibration and 20 mm/s for dangerous vibration , while for compressor casing vibration velocity limit is 12.5 mm/s , therefore . These limits are −considered in the present work.

The fault detection and diagnosis results indicate that the vibration limitation are similar for both fault diagnosis simulation and standard limitation are given by the company manufacturing of gas turbine unit.

The second categories the simulation of gas turbine by MATLAB software. As expected the results showed that the compression ratio, ambient temperature, air to fuel ratio strongly influence the thermal efficiency, also the results also showed the thermal efficiency and power output, both decrease linearly with increase of the ambient temperature and air to fuel ratio. However the specific fuel consumption were seen to increase linearly with the increase of both ambient temperature and air to fuel ratio. Thus, the thermodynamic parameters on cycle performance are economically feasible and beneficial for the gas turbine operations.