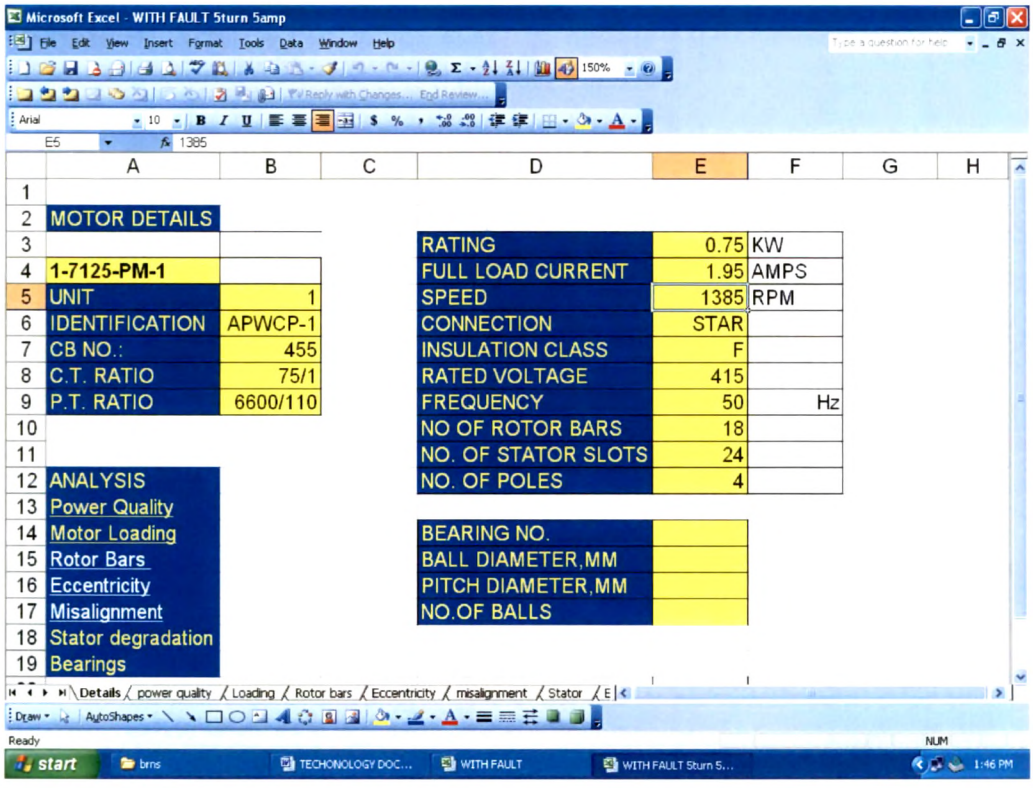
CHAPTER VI

DEVELOPMENT OF SOFTWARE

6.1 Introduction

The software is developed based on fault detection algorithm in excel platform. The software starts with the inputs of the motor to be analyzed. The screen shot for the same is given below.



Photograph No.6.1 Software for MCSA

It has seven different modules.

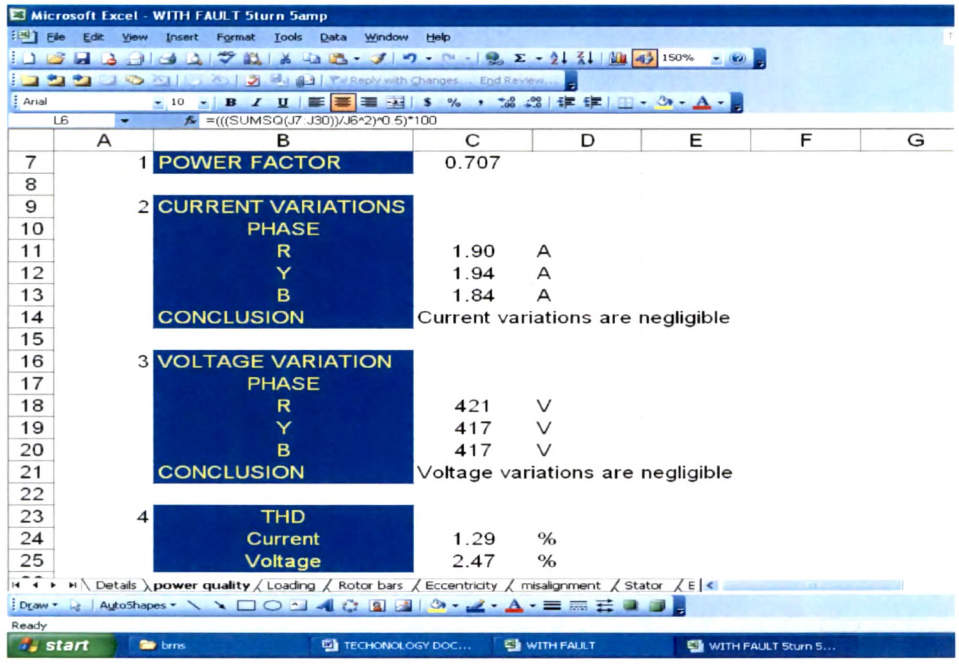
1. Power Quality
2. Motor Loading
3. Rotor bars
4. Eccentricity
5. Misalignment
6. Stator Degradation
7. Bearings

The instantaneous samples of the voltage and current are transferred to the FFT software, wherein the signal is converted into its frequency spectrum. These values of frequency and magnitude of signal are transferred to Excel for analysis.

6.2 Software Description

6.2.1 Power Quality Module

The first step towards analysis is the calculation of RMS values of three voltages and three current. These are performed under software module of power quality. It also calculates the power factor, voltage variations, current variations, THD in voltage and current. The screen shot for power quality module is given below

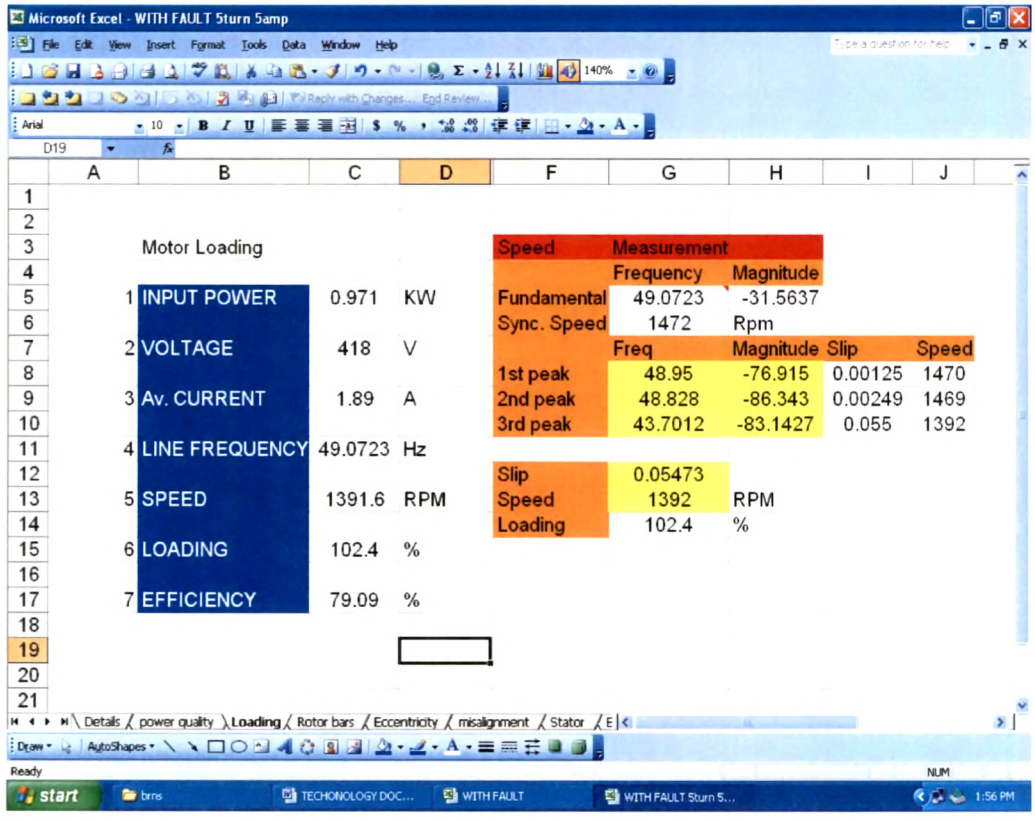


Photograph No. 6.2: Power Quality Module

6.2.2. Motor Loading Module

It calculates the input power taken by the motor, Av, voltage , Av. Current, Line frequency from the Instantaneous samples of the voltage and current. It also calculates the slip/speed of the motor from the current signature /spectrum of motor.

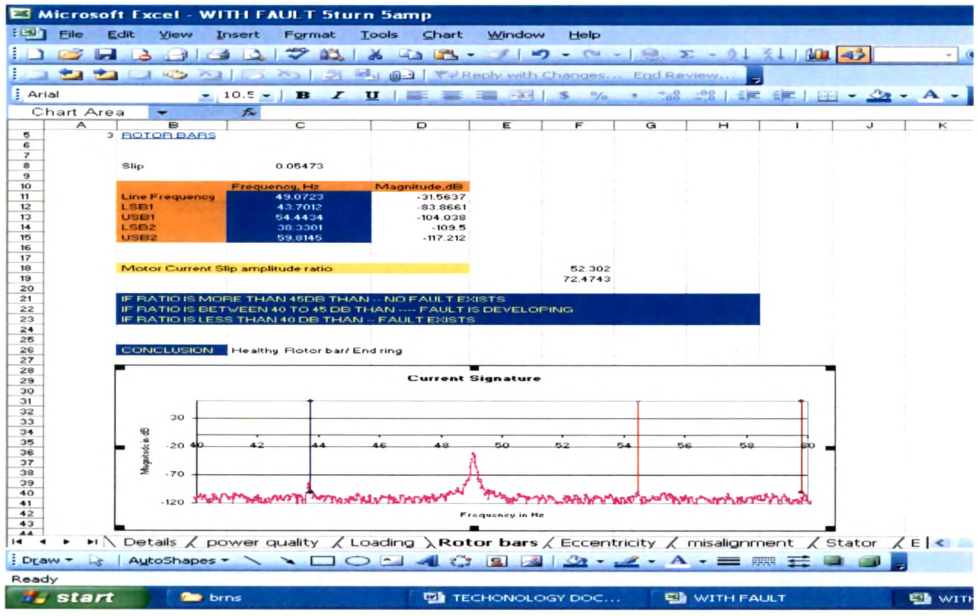
Based on the speed of the motor and input parameters, it also estimates the loading and efficiency of the motors. The Screen shot of this module is given below



Photograph No. 6.3: Motor Loading Module

6.2.3 Rotor Bars

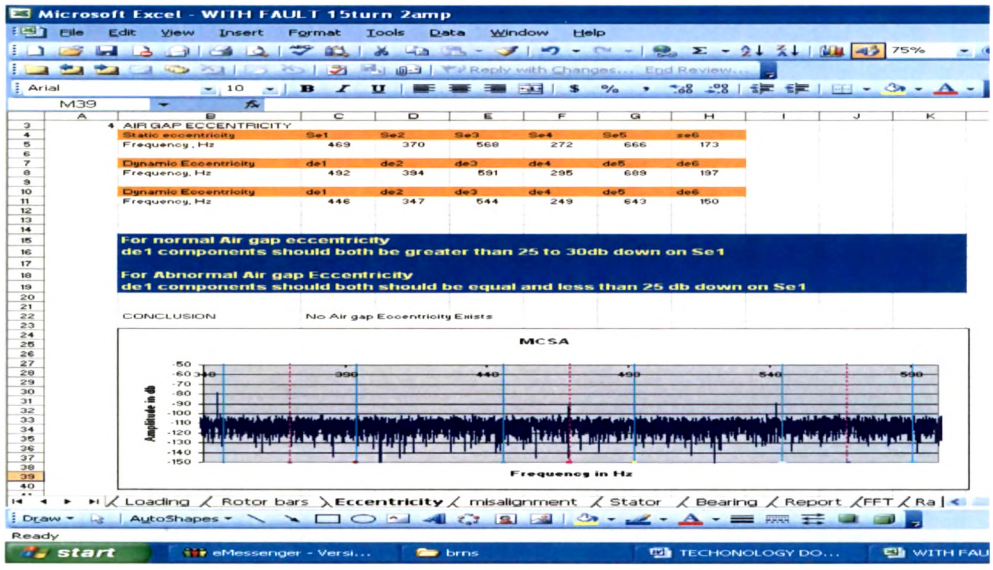
This modules evaluates the healthiness of rotor bars and end rings based on current spectrum /signature. It calculates the possible fault frequencies and finds it magnitude from current signature. It also calculates the motor slip ratio and based on this ratio it estimates the healthiness of the rotor bars and end rings. It also displays the current signature for that particular frequency and possible fault frequencies. The screen shot for the same is shown below



Photograph No. 6.4: Rotor Bar Module

6.2.4. Eccentricity Faults

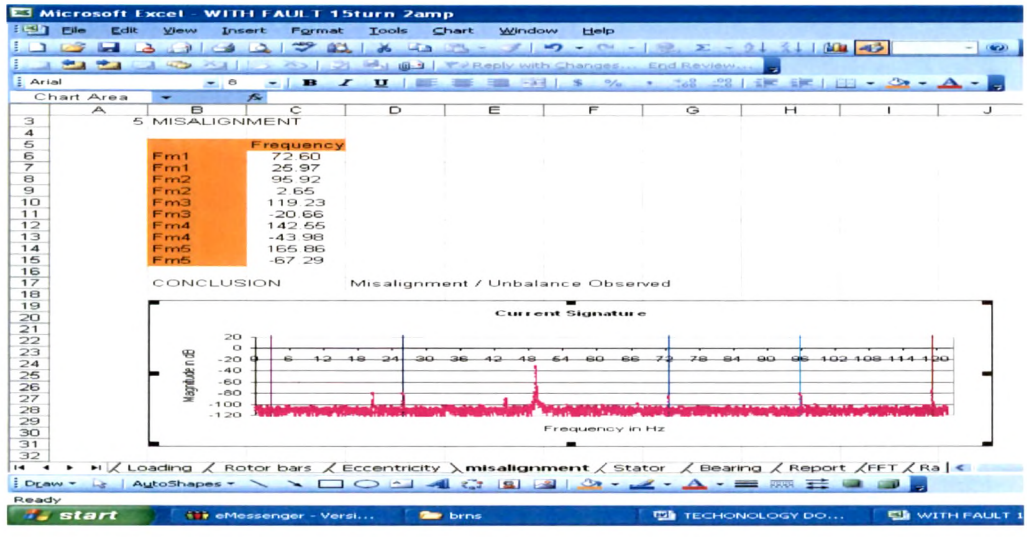
This module evaluates the healthiness for motor with respect to eccentricity inside the motor. It calculates the all possible fault frequencies. It also finds the magnitude of these frequency components. It displays the current signature in the respective band of frequency. Based on the algorithm the magnitudes are compared and decision on the type of fault is given. The screen shot for the same is given below



Photograph No. 6.5 : Eccentricity Module

6.2.5. Misalignment / Unbalance

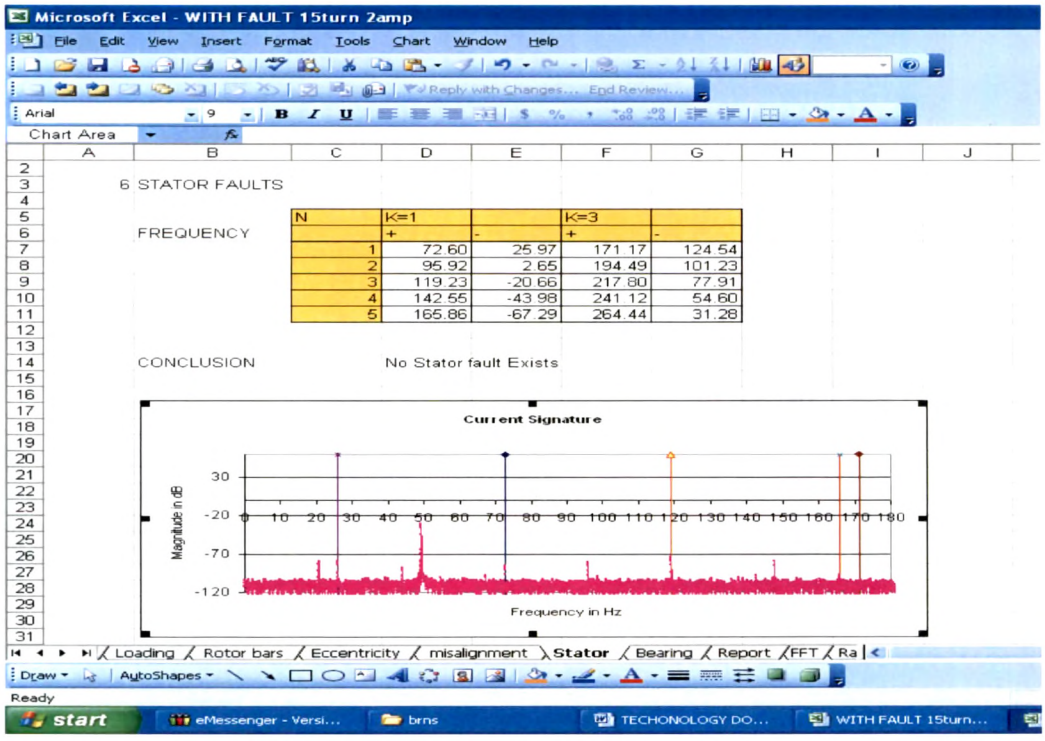
This module gives the information about the misalignment /unbalance between the motor shaft and load shaft. It calculates the frequency components and display the current signature in the respective band of frequency.



Photograph No:. 6.6: Misalignment/ Unbalance Module

6.2.6 Stator Faults

This module analyzes the stator faults. It calculates the possible fault frequencies. It also calculates the magnitude of the same and displays the current signature in the respective bands of frequencies. The screen shot for the same is given below

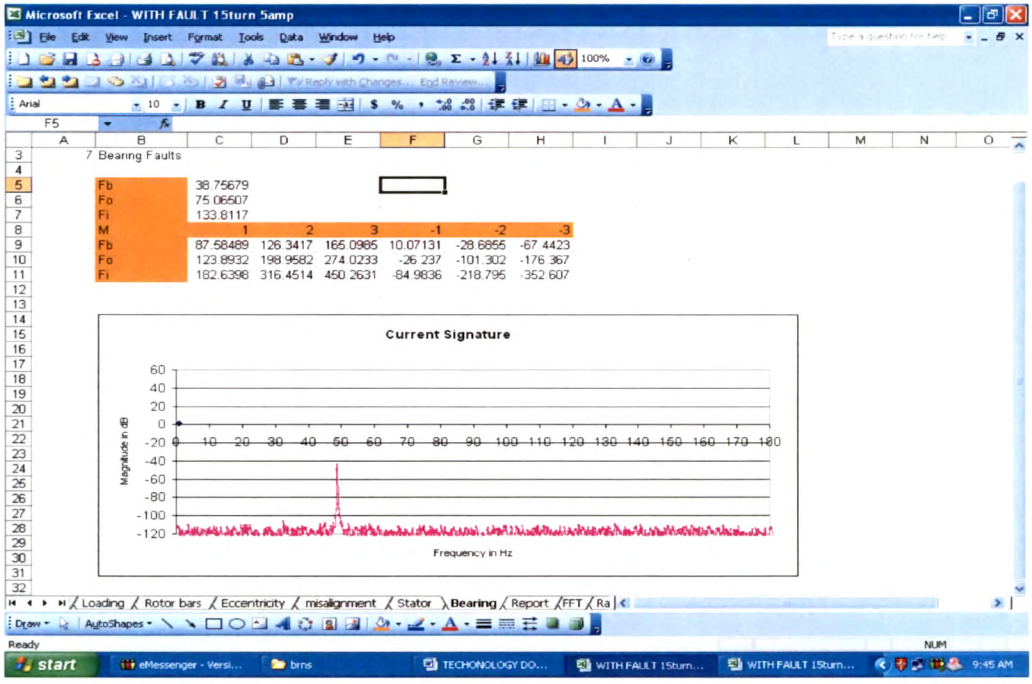


N	K=1 +	K=1 -	K=3 +	K=3 -
1	72.60	25.97	171.17	124.54
2	95.92	2.65	194.49	101.23
3	119.23	-20.66	217.80	77.91
4	142.55	-43.98	241.12	54.60
5	165.86	-67.29	264.44	31.28

Photograph No. 6.7: Stator fault Module

6.2.7 Bearing Faults

This module gives the information about the typical bearing faults. It calculates the bearing fault frequencies based on the dimension of the bearing. It also calculates the magnitude of these frequencies. It displays the current signature in the respective band of frequencies.



Photograph No. 6.8 Bearing Fault Module

The above analysis along with the signature can also be printed as per the will. Software alone will not be able to interpreted the analysis made, hence the human interpretation based on the fault detection algorithm is also suggested.

6.3 Conclusion

The software is developed as per the fault detection algorithm. It predicts the fault frequencies for different kinds of faults. It also searches the required frequency in the spectrum of voltage and current both and gives the conclusion about the health of motor based on fault detection algorithm. However some degree of human intervention is required.