

CHAPTER - V
RESULTS AND DISCUSSION

5.1 INTRODUCTION

Previous chapters III & IV describe in detail the design and development of the system and system software. The present chapter simulate the performance of the DC motor in order to get the theoretical performance. The developed system is used to record the different parameters which are used further for calculation. The performance of the motor is studied at different load condition by using the belt load. The practical and simulated results are compared at last.

5.2 THEORETICAL PERFORMANCE OF DC MOTOR

To study the performance of motor and accuracy of the measuring system, it is necessary to compare the evaluated theoretical results with the practical results obtained by the system. The theoretical performance of DC motor is carried out by using personal computer. The word simulation means to study the characteristics of any industrial process by giving properties of small elements to computer. It works on the data and determine whether the overall process will work in good manner or not. Thus the overall study of the complex system is necessary.

Simulation of any electronic circuit means without providing any current / voltage to the circuit, we can study characteristics of it . That means to “ run ” the circuit through software. The simulated performance of the motor is obtained for the different speeds. The following characteristics are studied through the simulation

5.2.1 SPEED CURRENT CHARACTERISTICS

Variation of armature current is studied as the function of speed. Fig. 5.1 shows the plot of speed versus current. From the figure it is seen that armature current decreases with increase in speed.

5.2.2 CHARACTERISTICS SPEED TORQUE

Torque of the motor is studied as the function of the speed. These results of speed versus Torque are shown in the fig. 5.2. From the fig it is seen that as the speed is inversely proportional to torque developed.

5.2.3 TORQUE CURRENT CHARACTERISTICS

Fig. 5.3 shows the variation of torque with armature current. From the fig it is seen that torque is directly proportional to current.

5.3 PRACTICAL PERFORMANCE

To study the performance of the system measurements are done for DC series motor. With the developed system and performance compared with the simulation results. The various parameters are measured under the different load condition. This data is further used to determine the various performance parameters and following different characteristics are drawn from the experimentally collected data and compared with the theoretical values for various parameters for knowing the accuracy of the system.

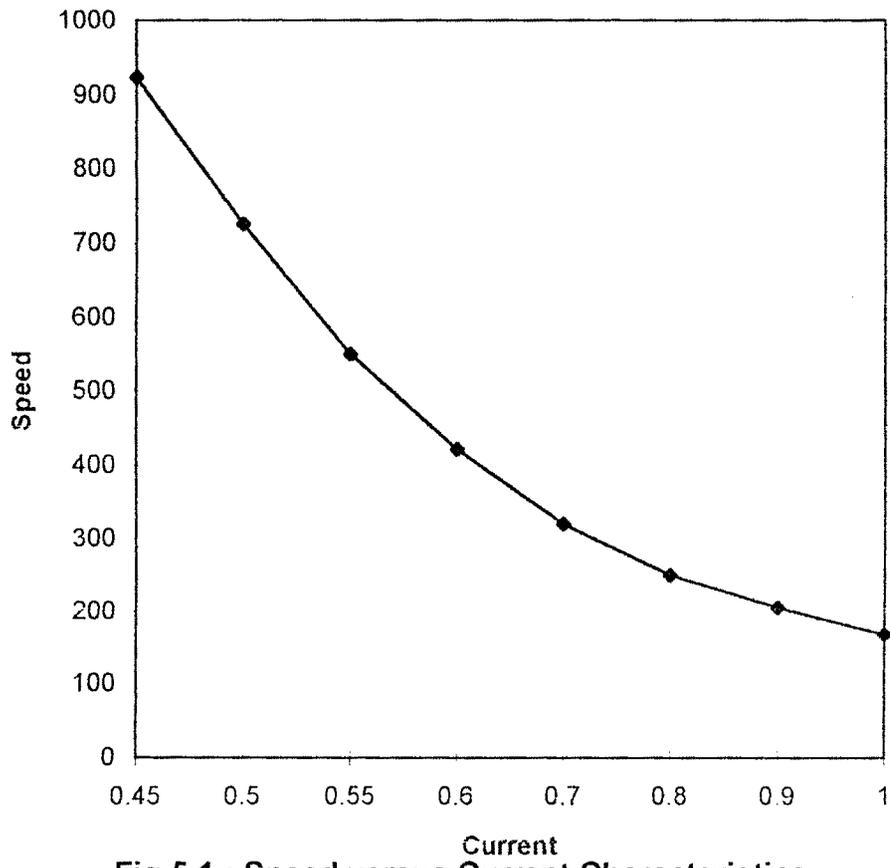


Fig 5.1 : Speed versus Current Characteristics

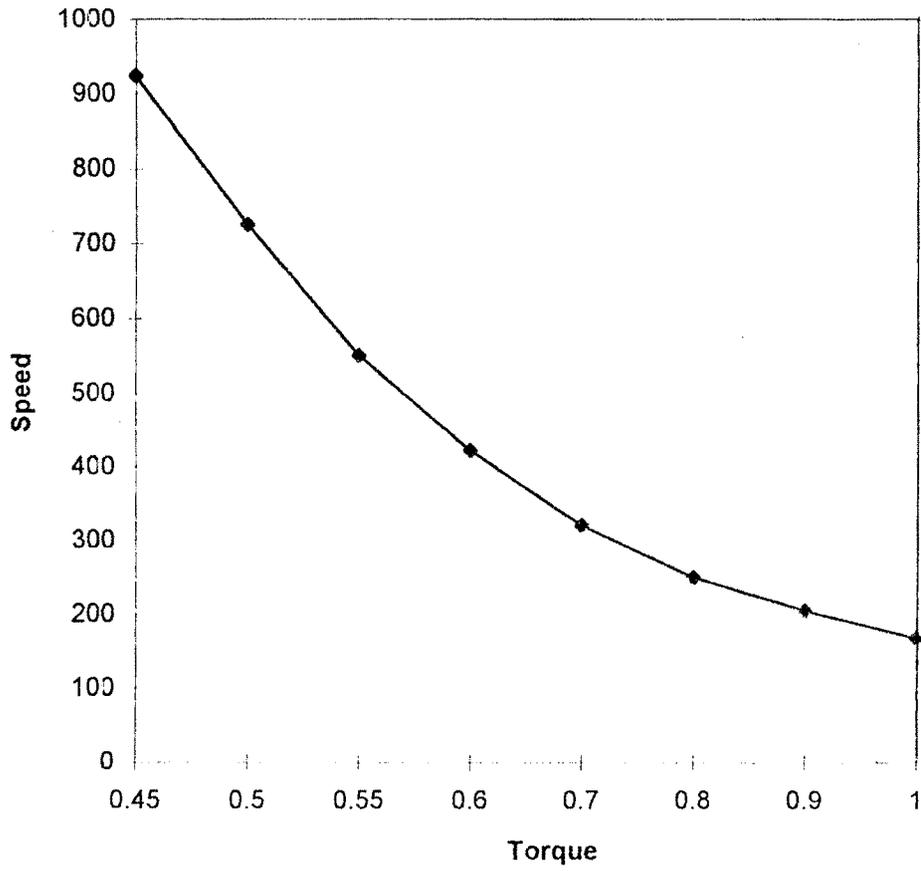


Fig. 5.2: Speed versus Torque characteristics

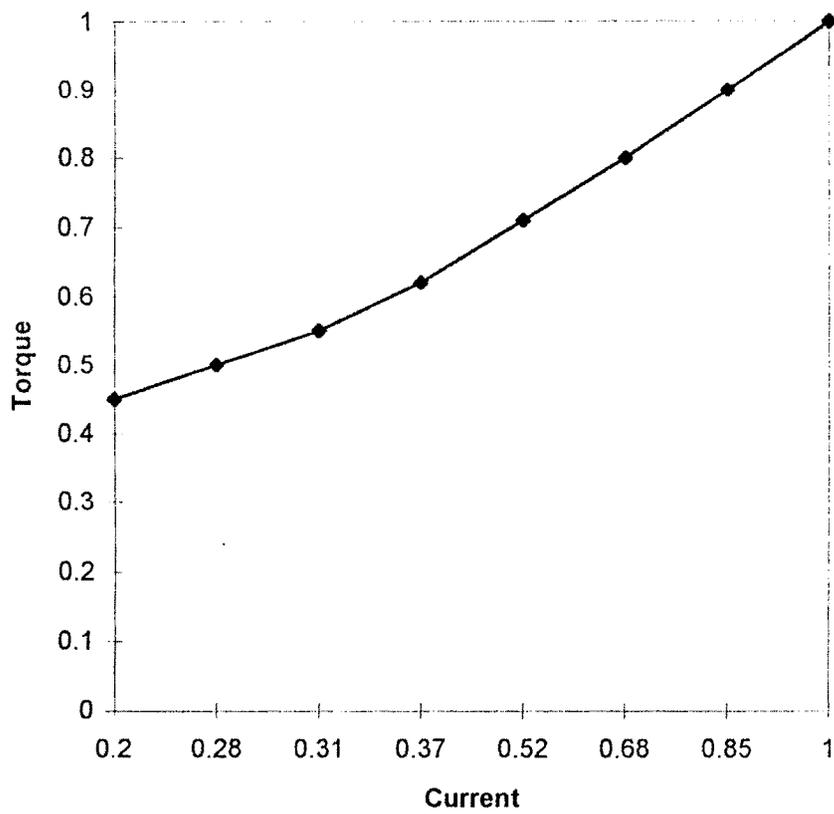


Fig. 5.3: Torque versus Current Characteristics

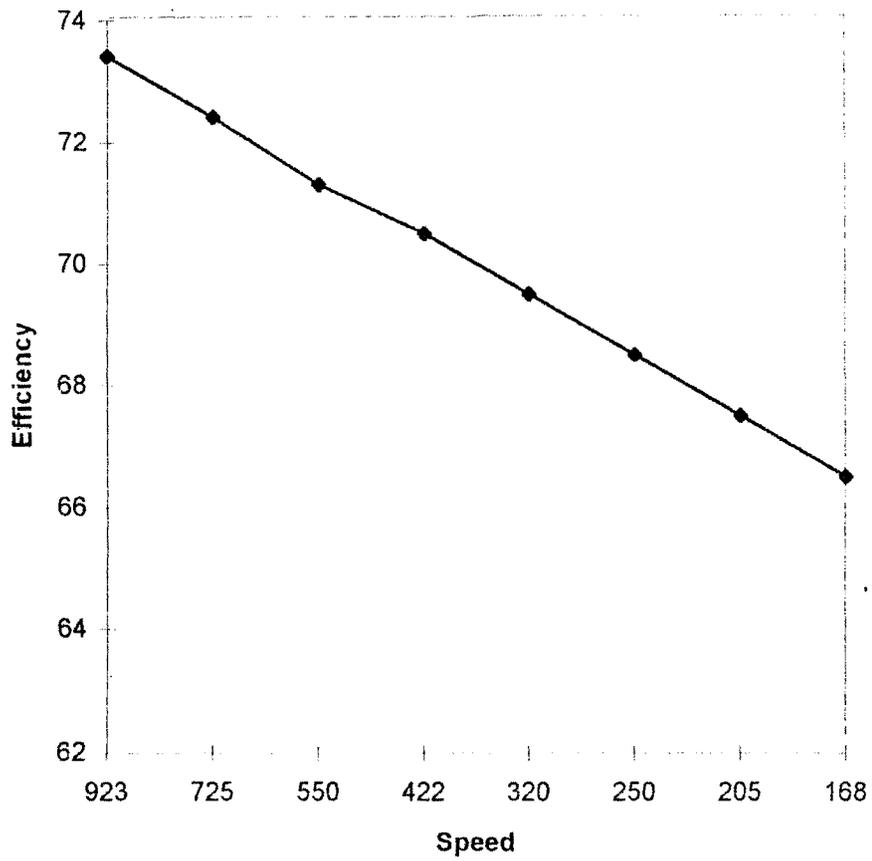


Fig.5.4 : Efficiency versus Speed Characteristics

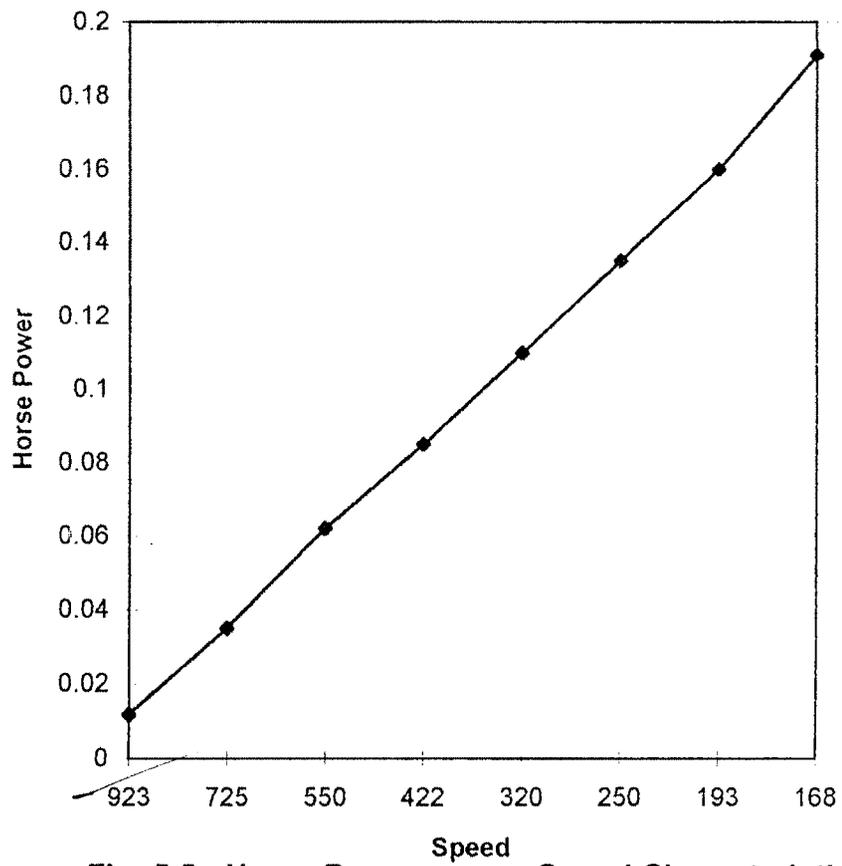


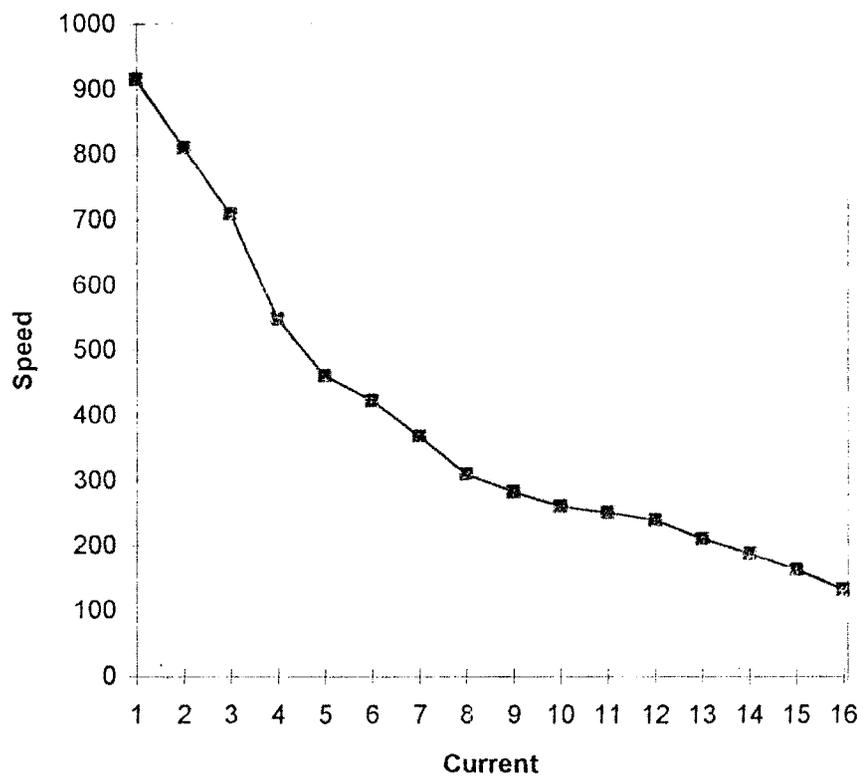
Fig. 5.5 : Horse Power versus Speed Characteristics

Fig. 5.6 shows the experimental result speed versus current. The nature of the graph is very similar to that of simulated results. The percentage of error is well within the acceptable range i.e. +2%. It is found that these values are in good agreement with the simulated results.

Fig. 5.7 shows the variation of speed versus torque under different load conditions. The percentage of error is 2%. Fig. 5.8 shows the plot of Torque versus current characteristics of motor under different speeds. These results shows that the practical results are close to theoretical results.

5.4 COMPARISON OF RESULTS

In the present work performance of motor parameters are measured with the data acquisition system. We have used belt coupling. This gives source deviation in measurement of the various parameter which is not observed with simulation results. From the comparison of the simulation results and results obtained by the data acquisition system. It is found that all the performance parameters like torque, efficiency, horse power are slightly less than that of the theoretical results. This discrepancy may be because of losses in the machine.



fFig. 5.6: Speed versus Current Characteristics

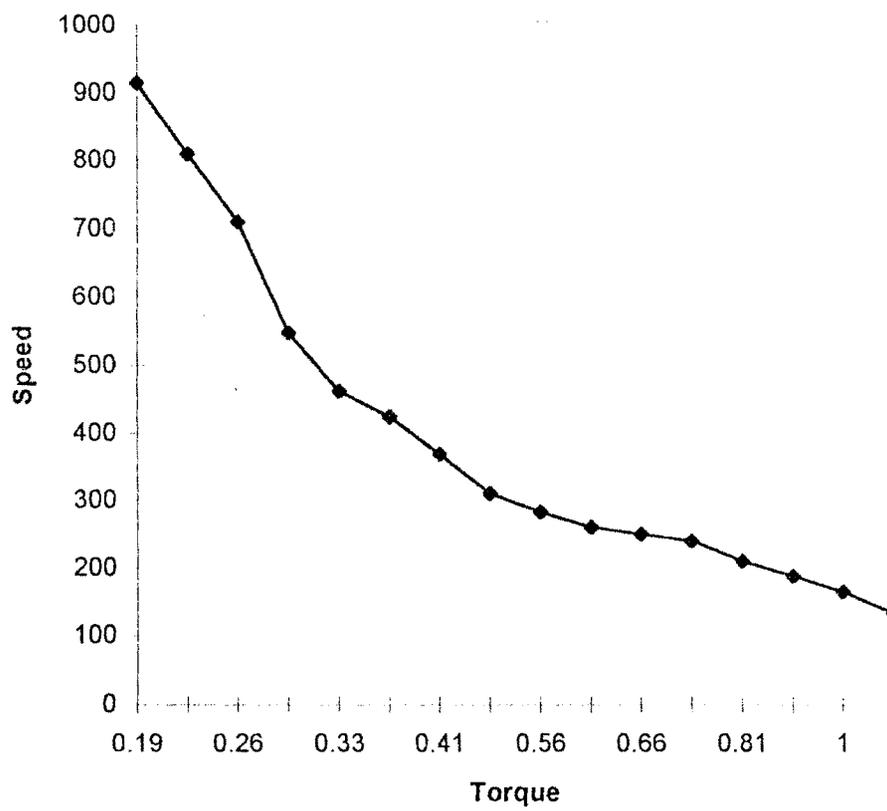


Fig. 5.7 : Speed versus Torque Characteristics

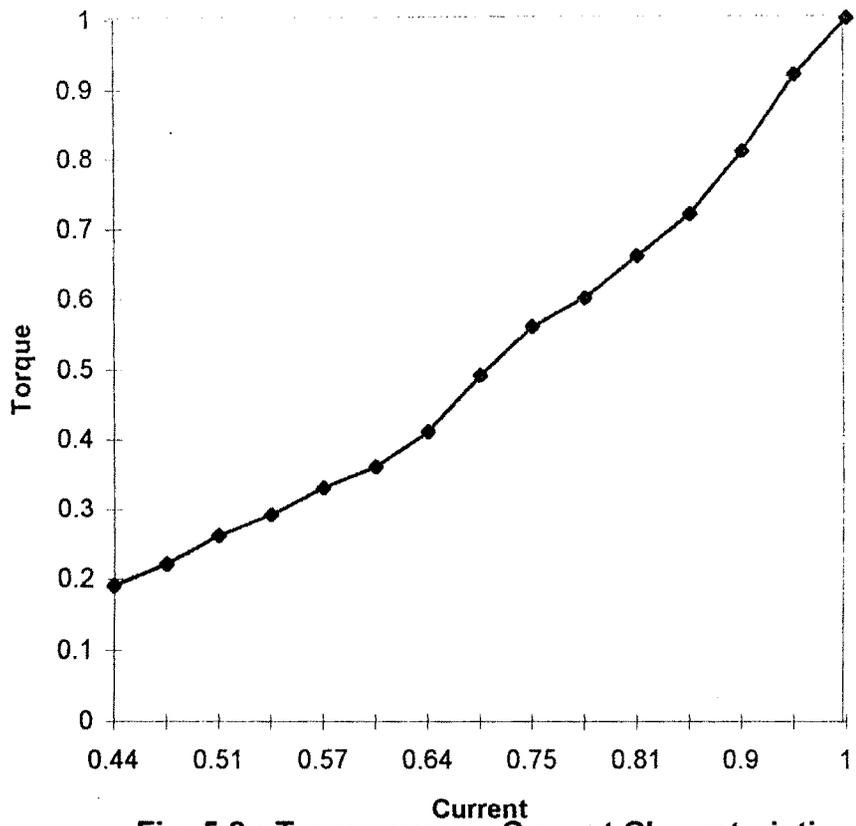


Fig. 5.8 : Torque versus Current Characteristics

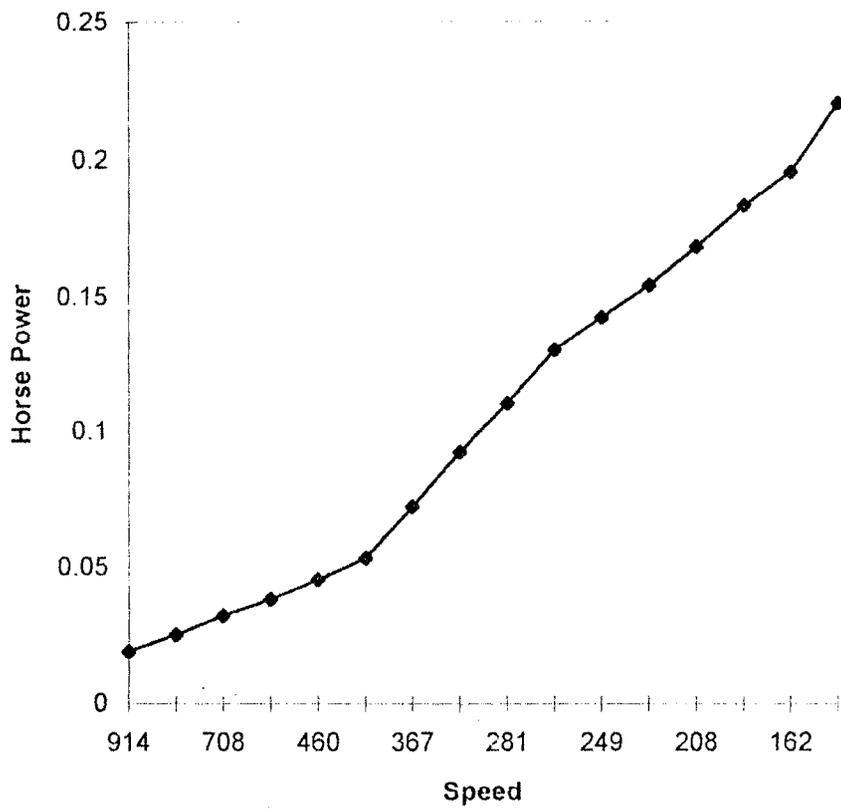


Fig. 5.9 : Horse Power versus Speed Characteristics

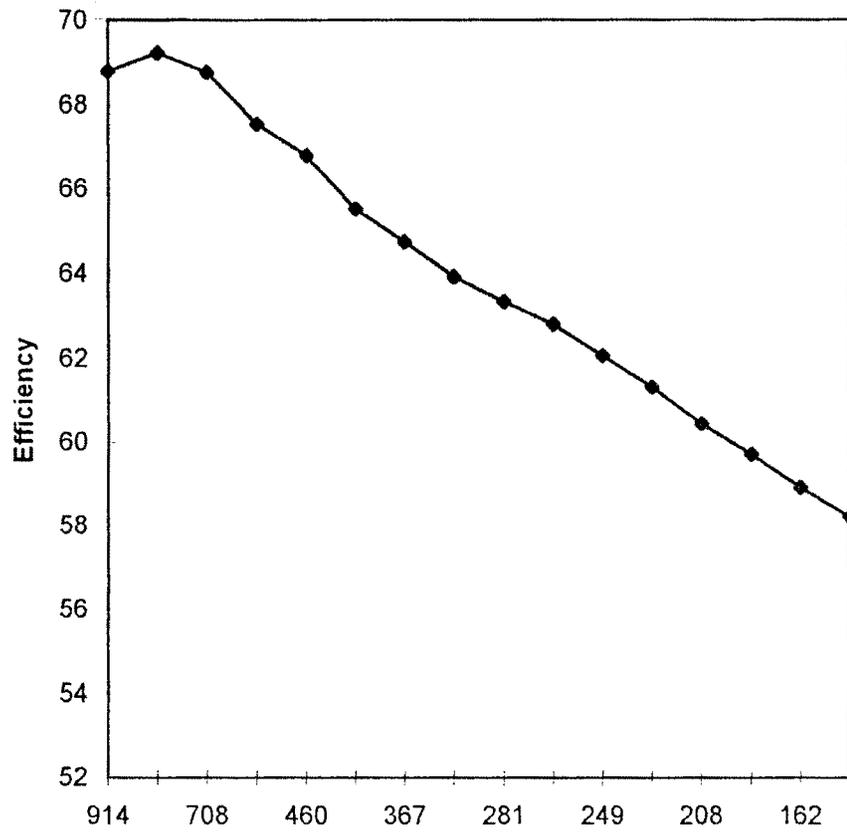


Fig 5.10 : Efficiency versus Speed Characteristics