

Chapter One

Introduction

1.1 Introduction

Internal combustion engines (IC) are seen every day in automobiles. The name of internal combustion refers also to gas turbines but is always applied to internal combustion engines that we find every day in automobiles. For the last 300 years human beings have wrestled with the task of converting chemical energy stored in fuels into useful work. The internal combustion engine was developed in late 1800s, it has been the foundation for the successful development of many commercial technologies. Consider how the engine transformed the transportation industry allowing the improvement of automobiles.

The internal combustion engines can deliver power in the range from 0.01 kW to 20,000 kW depending on their displacement. The vast majority of internal combustion engines are produced for vehicular applications requiring a power output on the first order of 100 kW. For this internal combustion engines have become the prime mover in transportation technology in many places. The continuing use of the internal combustion engine in different application has result from its relatively low cost, high power to weight ratio, high efficiency, and simple operating characteristics.

The main components of an IC engine has not changed a lot from the beginning, it contains the engine block, piston, valves, crankshaft and connecting rod. The main differences between a modern day engine and one built 100 years ago are the thermal efficiency and the emission level. Since many years the research in

internal combustion engines is aiming towards improving the thermal efficiency and reducing noise, vibration, and emission levels. As a result the thermal efficiency has increased from about 5% in 1858 to 50% nowadays. There has also been a great deal of work devoted to reduce emissions from engines. Currently, improving volumetric power is one of the major factors in the design and operation of internal combustion engines.

1.2 Problem Statement

The quest of seeking high power output demands large engine displacement, thus large engine. Modern vehicles require small size and high power output. In order to meet these requirements a turbocharger should be used.

1.3 Aims and Objectives

This research aims :-

1. To Design a four stroke, compression ignition engine.
2. To add a turbocharger in order to reduce the size of the engine.
3. To study the effects on the temperature and other engine parameters after adding the turbocharger.

1.4 Scope

Thermodynamic and kinetics calculations were used to design the engine.

1.5 Methodology

The first step was to use the thermodynamic models and the kinetic models, to calculate the engine parameters. The second step was to add a turbocharger to the engine, calculate the engine parameters once more. Finally take the results from the calculations to design the engine using SOLIDWORKS.

