# Fabrication and Development of Turbocharger Test Rig Based on SI-Engine

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**Abstract – Although there is large development in the engine in last few decades it is still lagging in the performance in the sense of fuel economy and exhaust emission. It is necessary to develop an engine which is more efficient and has less exhaust emission. As increase largely the automotive vehicle it is necessary for reducing the less fuel consumption of vehicle such that the engine has to be run with high efficiency. So to enhance the performance of engine better utilization of intake charge is necessary, different techniques are introduced in form of modification of intake manifold, development of swirl and tumble devices, modification of piston profile for efficient combustion of charge. Energy efficient exhaust system development requires minimum fuel consumption and maximum utilization of exhaust energy for reduction of exhaust emission. It is necessary to minimize the fuel consumption and increase the efficiency of engine so the parameters are to be considered for increasing the engine output. Energy efficient exhaust system development requires minimum fuel consumption and maximum utilization of exhaust energy for reduction of exhaust emission. It is necessary to minimize the fuel consumption and increase the efficiency of engine so the parameters are to be considered for increasing the engine output.**

**Index Terms - Engine, Turbocharger, Supercharger, Thermocouple.**

## 1. INTRODUCTION

The main aim of the engine designer, to achieve the twin goals of improves power output. There are two factors in the expression apart from number of cylinder and cubic capacity of the engine can increase the power output. These can be achieved by supplying air or air fuel mixture at a pressure which is higher than the atmospheric pressure. These in turn will increase the power output of the engine. The turbocharger turbine which consist of a turbine wheel and turbine housing, converse the engine exhaust gas into mechanical energy to drive the compressor. This compressed air is then supplied to the engine for increasing the performance of engine and testing the change in the efficiency of engine by means of certain parameters. These helps to increase and to create the highly efficient and more efficient engine for getting the create output with the minimum losses.

## 1. TURBOCHARGER

Turbochargers were originally known as turbosuperchargers when all forced induction devices were classified as superchargers. Nowadays the term "supercharger" is usually applied only to mechanically driven forced induction devices. The key difference between a turbocharger and a conventional supercharger is that a supercharger is mechanically driven by the engine, often through a belt connected to the crankshaft, whereas a turbocharger is powered by a turbine driven by the engine's exhaust gas. Compared to a mechanically driven supercharger, turbochargers tend to be more efficient, but less responsive. Twin charger refers to an engine with both a supercharger and a turbocharger.

Fig -1: Turbocharger

## 2. ENGINE (PULSAR-150CC)

An engine or motor is a machine designed to convert one form of energy into mechanical energy. The original Pulsar came with a 150 cc air-cooled, single-cylinder, petrol, spark-ignited four-stroke engine which made 13 HP of maximum power. They featured a single spark plug to ignite the air-fuel mixture fed from a carburetor, simple spring shock absorbers, round headlamp dome and 1,265 mm wheelbase. Disc brakes as

standard equipment were a novelty in Indian motorcycles of the early 2000s. Other standard features were parking lights and an aircraft-type fuel tank lid.

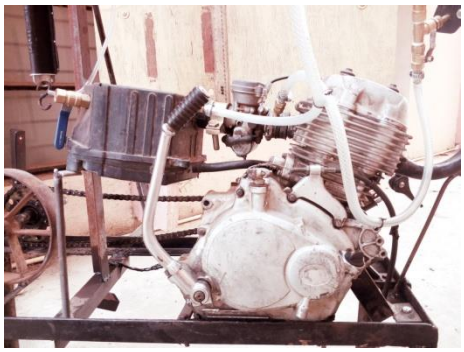

Fig -2: Engine

## 3. THERMOCOUPLE

Thermocouples are widely used in science and industry; applications include temperature measurement for kilns, gas turbine exhaust, diesel engines, and other industrial processes. Thermocouples are also used in homes, offices and businesses as the temperature sensors in thermostats, and also as flame sensors in safety devices for gas-powered major appliances. Commercial thermocouples are inexpensive, interchangeable, are supplied with standard connectors, and can measure a wide range of temperatures. In contrast to most other methods of temperature measurement, thermocouples are self powered and require no external form of excitation. The main limitation with thermocouples is accuracy; system errors of less than one degree Celsius (°C) can be difficult to achieve.


Fig -3: Thermocouple

## 4. ROPE BRAKE DYANAMOMETER

Dynamometers are used to provide simulated road loading of either the engine or full power train. Dynamometer helps to apply load on any rotating part and helps for calculating the efficiency of engine. A dynamometer or dyno for short is a device for measuring force, torque or power. For example the power produced by an engine , motor or other rotating prime mover can be calculated by simultaneously measuring torque and rotational speed (RPM).

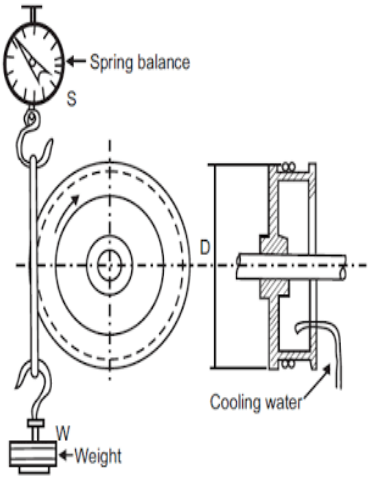


Fig -4: Rope brake dynamometer

## 5. CONSTRUCTION AND WORKING

The experimental arrangement is as shown in figure. The exhaust of engine pulsar 150 is given to the turbine section of the turbocharger. Due to emission of exhaust gases from the engine it helps to rotate the turbine as gradually the turbine and compressor are directly coupled to each other. Due to emitted gases from engine the turbine will rotate and due to that the compressor also rotates as the compressor has two ports, for suction of gases from air and other for passing the compressed gas. These compressed gases then given to the engine. These helps for supplying the excess of oxygen for complete combustion of fuel and which directly responsible for improvement of engine performance and efficiency. The fuel tank is used to supply fuel to engine and manometer which is then measured the mass flow rate of fuel going into the engine. As engine starts, the output shaft of engine will transfer the rotation to the rope brake dynamometer. The loading on engine is generally carried out by rope brake dynamometer. The experimentally then by calculating the efficiency by considering the various parameters. The calculations of engine parameter by calculating brake power specific fuel consumption, and efficiency. The efficient and ecconomical engine generation is an main goal of an expriment. Excess compressed air from the turbocharger is supplied to the engine for complete combustion of fuel. These helps in the performance such it will increase the efficiency of engine reducethe exhaust gas emisson. Energy efficient exhaust system development requires minimum fuel consumption and maximum utilization of exhaust energy for reduction of exhaust emission. It is necessary to minimize the fuel consumption and increase the efficiency of engine so the parameters are to be considered for increasing the engine output.

Fig -5: Experimental setup

## CONCLUSION

Energy efficient exhaust system development requires minimum fuel consumption and maximum utilization of exhaust energy for reduction of exhaust emission. It is necessary to minimize the fuel consumption and increase the efficiency of engine so the parameters are to be considered for increasing the engine output. The various methods like turbo charging, supercharging, intercooling and triple spark ignition system which are generally responsible for increment of engine output.

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