International Journal of Advanced Technology in Engineering and Science
Vol. No.4, Issue No. 04, April 2016
www.ijates.com
ijates
ISSN 2348 - 7550

PERFORMANCE ANALYSIS OF SUPERCHARGER AND TURBOCHARGER USING ETHANOL GASOLINE BLEND

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ABSTRACT

There are many inventions aimed at incrementing the performance of IC engines. In general, practical engines are always compromised by trade-offs between different properties such as efficiency, weight, puissance, heat, replication, exhaust emissions, or noise. When power increases efficiency is always decreases. Presently, ethanol is prospective material for use in automobiles as an alternative to petroleum predicated fuels. The main reason for advocating ethanol is that it can be manufactured from natural products or waste materials, compared with gasoline, which is engendered from non-renewable natural resources.

Some methods and components are utilizable for incrementing performance of engine. One such method is the utilization of supercharger in I.C. Engine. It is kenned that the puissance outputs of an engine increases with the incrementation in amount of air or coalescence in the cylinder and supercharger plays a paramount role in incrementing the amount or air. Till now supercharger is being prosperously employed in cumbersomely hefty engines but its use with more minute engine is still under development.

Keywords: Boost Power, Ic Engine, Petrol Engine, Supercharger, Turbocharger

I. INTRODUCTION

1.1 Supercharging

It is kenned fact that the potency output of an engine increases with an incrementation in amount of air or amalgamation in the cylinder at the commencement of compression stroke because it allowsthe burning of more quantity of fuel. The amount of air induced per unit time can be incremented by incrementing engine speed or incrementing air density during suction stroke. The incrementation in engine speed requires rigidAnd robust engine as the inertia load increases rapidly with an increases celerity. The engine friction and bearing loads additionally increase and volumetric efficiency. Falls with incrementing speed of engine. Consequently this is not possible. Now another method in which we have to increment the suction pressure is called supercharging. Equipment utilized for this is called Supercharger.

The puissance output is withal be incremented by incrementing the compression ratio, but is withal not desirable as it increase the maximum cylinder pressure. The rate of incrementation in maximum Pressure in cycle with incremented compression ratio is less than the rate of incrementation in BMEP in case of supercharged engine.

Ergo more power can be obtained by supercharger compared with by incrementing the compression ratio for given maximum cycle pressure. In advisement to this the rate of Incrementing maximum temperature is withal low in supercharger engine and this result in lower thermal loads. In the unsupercharged car engine, when a piston is drawn by the connecting rod to the bottom of the cylinder, an amalgamation of petrol and air enters the cylinder via the inlet valve And manifold, from the carburetor. This charge is compressed by the piston during the upward peregrinate, and is conclusively ignited by the spark plug and burning, exerts a pressure on the piston on its 'work' stroke. Now this charge which was 'drawn in' by the piston can vary in size for a number of reasons. The piston moving down the cylinder does not draw in the charge. It sanctions it to Enter by getting out of the way.

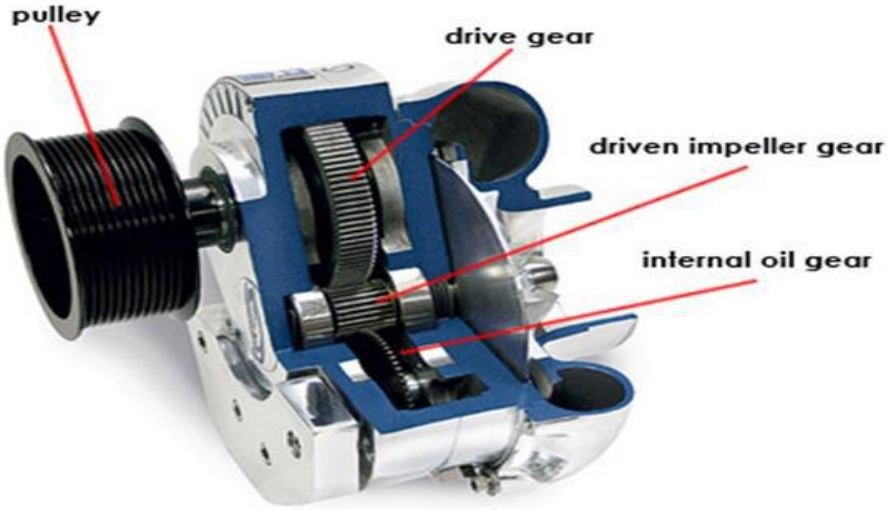

Fig.1: Supercharger

1.2 Turbocharging

BMW was the first to utilize turbo-charging in an engenderment passenger car when they launched the 2002 in 1973. The car was brilliantly packaged too and paved the way for a simply magnificent 'Turbo Era' in the automotive world. A turbocharger is a contrivance used to sanction more power to be engendered for an engine of a given size. A turbocharged engine can be more potent and efficient than a naturally aspirated engine because the turbine forces more intake air, proportionately more fuel, into the combustion chamber than if atmospheric pressure alone is utilized. Its purport is to increment the volumetric efficiency of the combustion chamber. Sundry incipient technologies have been introduced to avail the turbocharging of internal combustion engine so that the volumetric efficiency may amend more. These technologies include inter-cooling of the charged air afore going in to the combustion chamber so that its mass flow rate is incremented. The other technology is twin charging in which firstly the engine is boosted by a supercharger then it is boosted by a turbocharger when the energy of exhaust gas is ample to rotate the turbine blades.

In turbocharging, the turbocharger is being driven by a gas turbine utilizing the energy in exhaust gases. The major components of turbocharger are turbine wheel, turbine housing, turbo shaft, comp. wheel, comp. housing & bearing housing.

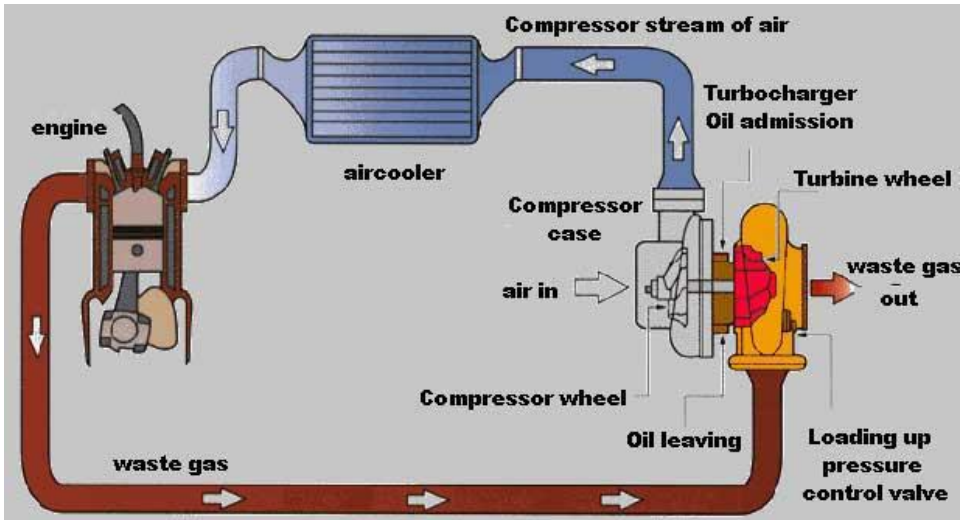

Fig.2:- Turbocharger

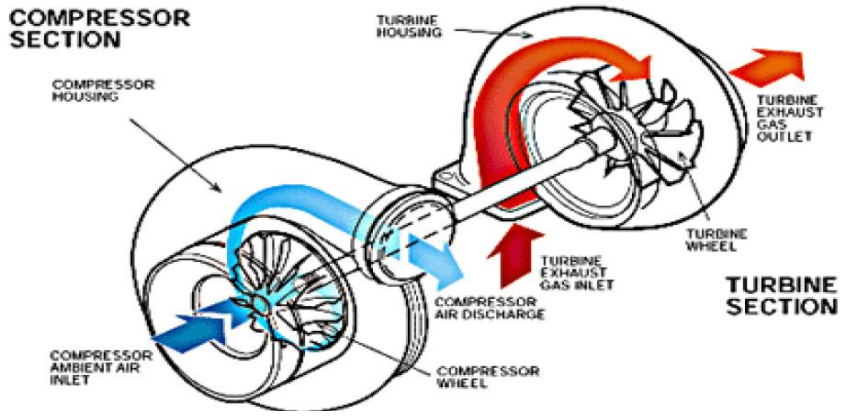

Fig.3:-Working Of Turbocharger

II. COMBINATION OF SUPERCHARGER AND TURBOCHARGER IN IC ENGINE

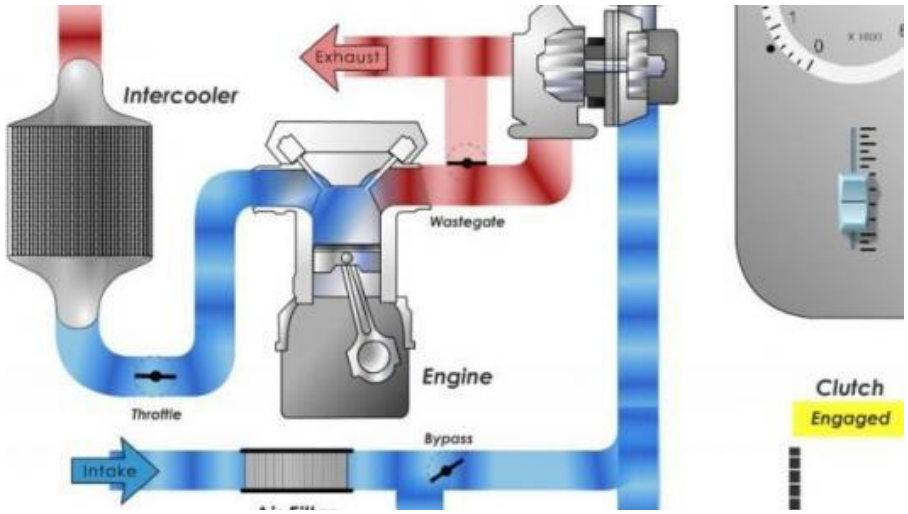

Fig.4:-Performance Of Supercharger And Turbocharger

III. DIFFERENCE BETWEEN SUPERCHARGER & TURBOCHARGER

Unlike the turbochargers that require cool down time, or warm up time, the supercharger is yare to go when you are. At 2000 rpm, boost is already available with a supercharger. When it comes to fuel efficiency, superchargers authentically kind of avail to ameliorate your MPG.

The reason for better mileage is the fact that you do not have to drive the engine at full throttle due to available boost. However, anytime that you drive aggressively, fuel efficiency will suffer.

Fig.5:- Supercharger & Turbocharger

Installation of a supercharger customarily takes about 6 to 8 hours… if you are mechanically inclined and there is no cutting or welding required. Superchargers withal incline to last longer than turbo chargers because they do not require much maintenance and have a self-contained oil supply. Superchargers give you instant boost on demand and require very low maintenance. With boost available at 2000rpm, you don't have to optically canvass the other guy start jump pass you for long.This setup is ideal if you have a rear wheel drive car with lots of horsepower to spare, then the petty power it gloms from the engine is well compensated for.

IV. BENEFITS

4.1 Supercharging

1) Due to the lower volumetric displacement of the supercharged engine, frictional & thermal losses are less.

2) Brake power will increment about 30-45 percent because of incrementation in supercharged pressure as more amount of fuel will be burnt within the same period as the mass taken per stroke is incremented.

3) The puissance-to-weight ratio, i.e. kilowatt (power output)/kilograms (engine weight); of the supercharged engine is much better than that of the naturally aspirated engine.

4) The supercharged engine's installation space requisite is more minuscule than that of a naturally aspirate engine with the same power output.

5) The high altitude performance of a supercharged engine is significantly preponderant. Because of reduced engine is more diminutive; it is consequently less strepitous than a naturally aspirated engine with identical output.

6) It is very simple for high speed engine.

4.2 Turbocharging

1. More power compared to the same size naturally aspirated engine.

2.Better thermal efficiency over naturally aspirated engine and super charged engine, because the engine exhaust is being used to do the subsidiary work which otherwise would have been wasted.

3.Better Fuel Economy by the way of more power and torque from the same sized engine. A century of development and refinement—for the last century the SI engine has been developed and used widely in automobiles.

4. Low cost–The SI engine is the lowest cost engine because of the astronomically immense volume currently engendered.

5. High Thermal efficiency.

6. Better Volumetric efficiency.

7. Continual development of this technology has engendered an engine that facilely meets emissions and fuel economy standards. With current computer controls and reformulated gasoline, today's engines are much more efficient and less polluting than those built 20 years ago.

8. High speed obtained.

9. Better average obtained.

V. CONCLUSION

An endeavor has been made in this paper, the exhaust gas is utilized to rotate the turbine and then it is further worked with supercharger and turbocharger. Nowdays it is good with applications of incipient technology regard to economic considerations and engine efficiency.

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