Fabrication And Implementation Of Turbo Charger In Two-Wheeler

[1,]AMALOROPAVA DASS. J, [2,] Mr.SANKARLAL.P
[1,] M.E- (Thermal engineering) II-Year, J.J College of engineering and technology,Trichy.-620009.
[2,]Asst.Proffessor, J.J College of engineering and technology,Trichy.-620009.

Abstract

The progress of automobiles for transportation has been intimately associated with the progress of civilization. The automobile of today is the result of the accumulation of many years of pioneering research and development.An attempt has been made in this project, the exhaust gas is used to rotate the turbine with blower arrangement. Exhaust gas is used to rotate the blower and this air is given to the ignition input supply. Our fore most aim in selecting this project is to use efficiency turbo charging. It is also good with regard to economical considerations and engine efficiency.

Key words: Turbocharger;Efficiency;IC engines.

1. Introduction

The output of the engine exhaust gas is given to the input of the turbine blades, so that the pressurized air produced. This power, the alternate power must be much more convenient in availability and usage. The next important reason for the search of effective, unadulterated power are to save the surrounding environments including men, machine and material of both the existing and the next forth generation from pollution, the cause for many harmful happenings and to reach the saturation point. The most talented power against the natural resource is supposed to be the electric and solar energies that best suit the automobiles. The unadulterated zero emission electrical and solar power, is the only easily attainable alternate source. Hence we decided to incorporate the solar power in the field of automobile, the concept of many Multi National Companies (MNC) and to get relieved from the incorrigible air pollution**.**

2. Turbocharger

BMW was the first to use turbo-charging in a production 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. Swedish giant Saab took its cue from this and its ensuing 900 series was one of the most characteristic turbo cars of its time.Intercoolers the latest turbo's they are used by most of today's turbo-diesel engines to make the compressed air denser. It works like this - on starting, exhaust gases spin the turbine and thus activate a compressor that pressurizes the air. This pressurised air from the turbo-charger is then sent through a duct to an air-cooled intercooler, which lowers the temperature of the intake charge and thus increases its density. The air-cooled intercoolers receive air through separate intakes and that explains the small scoops and louvers usually found on the hoods of turbo-charged cars. Modern turbo-diesel engines also make use of a temperature-sensitive, motor-driven fan which boosts airflow at low engine speeds or when the intake air temperature is high. Though there are diesel engines that 'earn' a turbo-charger mid-way through their life, the usual practice is to design and develop an engine with a turbo-charger in mind. Then, as and when a turbo-charged model is added to the stable, the engine can adapt to it without any additional strengthening and cooling of engine parts. A well-engineered, turbo-charged diesel engine offers better fuel efficiency (at times by 15 per cent), better overall performance (better torque and high-end power), reduced noise (compared to normally aspirated diesel engines) and minimum engine maintenance (owing to better combustion of diesel fuel).Turbo looses steam Multiple valves and double-overhead camshaft designs developed reasonable performance without the complication of turbo-charging, and these methods were politically correct too since they consumed less fuel. Consequently today there are only a few petrol-powered road cars that still use turbo-chargers for enhanced performance.Computers soon started playing an even bigger role in cars. Engine management systems linked to fuel-injection systems meant getting more out of the engine was even easier. For example, one can buy chips that can boost power by 100 bhp for some Japanese cars, such as the Nissan Skyline. Moreover, on-road speeds were being restricted all over the world. Though most of the sports cars today are capable of doing more, they are restricted electronically not to exceed 250 kmph even in autobahn-blessed Germany. Turbo-charging lost its edge towards the end of the '80s and today this technology is used only in select performance cars. Porsche, for example, is all set to build a turbo-charged version of its all-new 911(water-cooled) with added performance. Turbo engines were banned in Formula One too with the idea of restricting the performance of the cars (and thereby making them safer too). There are many who consider this a backward step in the world of Formula One, which is considered to represent the 'tomorrow' of automotive technology.

But if one analyses the performance of normally aspirated cars in F1 today, (3,500 cc non-turbo), they perform as well, if not better, than the turbo cars of the early '80s.So, there are no full stops in technology. While road cars and even sports and racing cars are going in for more efficient engines, better metallurgy and wilder-than-ever electronics to get their engines to perform at an optimum level without sacrificing the performance edge, turbo-chargers still continue to serve the same purpose they were invented for albeit more so with diesel engines.

3.Methodology

3.1What is turbo-charging?

Turbo-charging, simply, is a method of increasing the output of the engine without increasing its size. The basic principle was simple and was already being used in big diesel engines. European car makers installed small turbines turned by the exhaust gases of the same engine. This turbine compressed the air that went on to the combustion chamber, thus ensuring a bigger explosion and an incremental boost in power. The fuel-injection system, on its part, made sure that only a definite quantity of fuel went into the combustion chamber.

3.2What the turbo-charger does?

What the turbo-charger was does is that it simply increases the volumetric efficiency of the engine. To give you an example: a 1,500 cc engine that produced, say, 60 bhp when it was normally aspirated, benefited at times with a 10- to 20-per cent power boost depending on the kind of turbo-charger used. Normally, the manufacturer would have had to resort to a bigger displacement in the engine, or design and develop an all-new engine to get more power from the same unit. In most piston engines, intake gases are "pulled" into the engine by the downward stroke of the piston (which creates a low-pressure area), similar to drawing liquid using a syringe. The amount of air which is actually inhaled, compared with the theoretical amount if the engine could maintain atmospheric pressure, is called volumetric efficiency. The objective of a turbocharger is to improve an engine's volumetric efficiency by increasing density of the intake gas (usually air). The turbocharger's compressor draws in ambient air and compresses it before it enters into the intake manifold at increased pressure. This results in a greater mass of air entering the cylinders on each intake stroke. The power needed to spin the centrifugal compressor is derived from the kinetic energy of the engine's exhaust gases. A turbocharger may also be used to increase fuel efficiency without increasing power. This is achieved by recovering waste energy in the exhaust and feeding it back into the engine intake. By using this otherwise wasted energy to increase the mass of air, it becomes easier to ensure that all fuel is burned before being vented at the start of the exhaust stage. The increased temperature from the higher pressure gives a higher Carnot efficiency. The control of turbochargers is very complex and has changed dramatically over the 100-plus years of its use. Modern turbochargers can use wastegates, blow-off valves and variable geometry, as discussed in later sections.The reduced density of intake air is often compounded by the loss of atmospheric density seen with elevated altitudes. Thus, a natural use of the turbocharger is with aircraft engines. As an aircraft climbs to higher altitudes, the pressure of the surrounding air quickly falls off. At 5,486 metres (17,999 ft), the air is at half the pressure of sea level, which means that the engine will produce less than half-power at this altitude.

4.Specification

4.1 Type Of Engine

Type of fuel used : Petrol
Cooling system : Air cooled
Number of cylinder : Single
Number of stroke : Two Stroke
Arrangement : Vertical
Cubic capacity : 100 cc

4.2 Spark Ignition Engine

A spark ignition (SI) engine runs on an Otto cycle—most gasoline engines run on a modified Otto cycle. This cycle uses a homogeneous air-fuel mixture which is combined prior to entering the combustion chamber. Once in the combustion chamber, the mixture is compressed, and then ignited using a spark plug (spark ignition). The SI engine is controlled by limiting the amount of air allowed into the engine. This is accomplished through the use of a throttling valve placed on the air intake (carburetor or throttle body). Mitsubishi is working on the development of a certain type of SI engine called the gasoline direct injection engine.

4.3 Advantages

- A century of development and refinement - For the last century the SI engine has been developed and used widely in automobiles. Continual development of this technology has produced an engine that easily 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.
- Low cost - The SI engine is the lowest cost engine because of the huge volume currently produced.

4.4 Disadvantages

The SI engine has a few weaknesses that have not been significant problems in the past, but may become problems in the future.

- Difficulty in meeting future emissions and fuel economy standards at a reasonable cost - Technology has progressed and will enable the SI engine to meet current standards, but as requirements become tougher to meet, the associated engine cost will continue to rise.
- Throttling loss lowers the efficiency - To control an SI engine, the air allowed into the engine is restricted using a throttling plate.
- The engine is constantly fighting to draw air past the throttle, which expends energy.
- Friction loss due to many moving parts - The SI engine is very complex and has many moving parts. The losses through bearing friction and sliding friction further reduce the efficiency of the engine.
- Limited compression ratio lowers efficiency - Because the fuel is already mixed with the air during compression, it will auto-ignite (undesirable in a gasoline engine) if the compression ratio is too high. The compression ratio of the engine is limited by the octane rating of the engine.

5. Emiission Control System

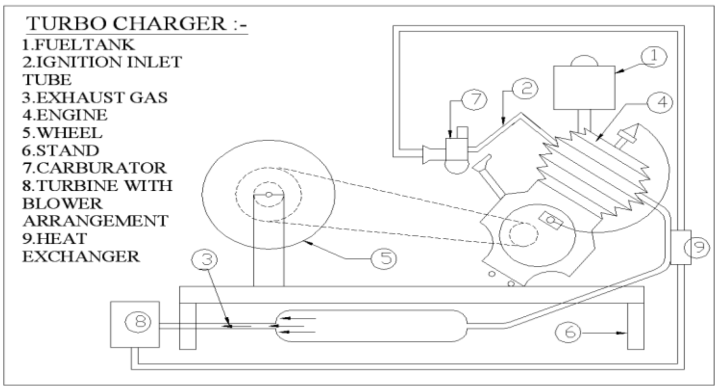
Automotive emissions contribute significantly to urban air quality problems. HEVs can reduce this contribution significantly through increased fuel economy, use of alternative fuels, and improved power unit and after treatment technology. A well-tuned spark ignition engine produces relatively low emissions. Significant emissions occur when the vehicle is started and warming up. During this time the engine must be choked to run properly. This creates excess unburned fuel in the exhaust, which leads to hydrocarbon and carbon monoxide emissions. During normal driving, emissions are relatively low because the air-to-fuel mixture is precisely controlled, allowing the catalytic converter to effectively reduce emissions. The diesel engine emissions are primarily nitrogen oxides (NO_x) and particulate matter (PM). NO_x is produced because the engine is operated with a lean air-to-fuel mixture. The high compression ratio of a diesel engine (required because of compression ignition) creates much higher pressure and temperature in the combustion cylinder. This lean mixture and high temperature cause the higher level of NO_x production. At high engine loads, where more fuel is injected, some of the fuel burns incompletely leading to the black smoke (PM) characteristic of a diesel engine.

6.Specification Of Four Stroke Petrol Engine:

Type	: Four stroke
Cooling System	: Air Cooled
Bore/Stroke	: 50 x 50mm
Piston Displacement	: 98.2 cc
Compression Ratio	: 6.6: 1
Maximum Torque	:0.98 kg-m at 5500 rpm

7. Experimental Setup

BLOCK DIAGRAM



8. Advantages
1. Efficiency of the vehicle is improved.
2. Small modification is done in the vehicle.
3. Fuel consumption is less when compared to ordinary vehicle.
4. Less pollution.
5. Emissions are controlled in the Engine.

9. Applications
1. Automobile application.

10.Disadvantages
1. Additional cost is required.
2. Additional space is required to install this arrangement in vehicles.

11. Future Scope
1. The Efficiency of the engine can be increased .
2. The Emissions from the engine can be controlled.
3. Fuel consumption is less when compared to ordinary vehicle.
4. Experimental Analysis of the Engine with Turbo charger.
5. A proto type of the turbocharger could be fabricated by suitable processes and tested by properly i nstalling it to a two -wheeler .

12. Conclusion
We have designed and fabricated a prototype of the Turbocharger was i mplemented in Two-wheeler, In which the efficiency of the Engine can be increased. Thus we h ave developed a method to increase the efficiency of the engine and at the same time to control the Emissions from the engine. The experimental setup of block diagram is shows the arrangement of turbocharger in two-wheeler. This type of engine will be more efficient than existing engines.

References

[1] Achten, P. A. J. 1994. .A Review of Free Piston Engine Concepts,. SAE Paper 941776.
[2] Alperstein, M., Swim, W. B. and Schweitzer, P. H. 1958. .Fumigation Kills Smoke . Improves
[3] Diesel Performance,. SAE Transactions, vol. 66, pp.574 . 588.
[4] Baruah, P. C. 1988. .A Free Piston Engine Hydraulic Pump for an Automotive Propulsion
[5] System,. SAE Paper 880658.
[6] Braun, A. T. and Schweitzer, P. H. 1973. .The Braun Linear Engine,. SAE Paper 730185.
[7] Caris, D. F. and Nelson, E. E. 1959. .A New Look at High Compression Engines,. SAE
[8] Transactions, vol. 67, pp. 112-124.
[9] Christensen, M., Johansson, B. and Einewall, P. 1997. .Homogeneous Charge Compression
[10] Ignition (HCCI) Using Isooctane, Ethanol, and Natural Gas . A Comparison With Spark
[11] Ignition Operation,. SAE Paper 972874.
[12] Christensen, M., Johansson, B., Amneus, P. and Mauss, F. 1998. .Supercharged Homogeneous Charge Compression Ignition,. SAE Paper 980787.
[13] Das, L. M. 1990. .Hydrogen Engines: A View of the Past and a Look Into the Future,.
[14] International Journal of Hydrogen Energy, vol. 15, no. 6, pp. 425 . 443.
[15] Edson, M. H. 1964. .The Influence of Compression Ratio and Dissociation on Ideal Otto Cycle
[16] Engine Thermal Efficiency,.Digital Calculations of Engine Cycles, SAE Prog. in
[17] Technology, vol. 7, pp. 49-64.
[18] Karim, G.A. and Watson, H.C. 1971. .Experimental and Computational Considerations of the
[19] Compression Ignition of Homogeneous Fuel-Oxidant Mixtures,. SAE Paper 710133.