IOSR Journal of Engineering (IOSR JEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 17-20

"A Review of Air Powered Engine"

Abdul Aziz Shaikh[1], Vilas R.Panmand[2], Swapnil Dumbare[3], Anwar A.Maniyar[4]
[1]PG Student, [2]Assistant Professor, [3]PG Student, [4]PG Student
[1]M.E Design, [2]E&tc Engineering, [3]M.E Design, [4]M.E Design
[1]Jaihind College of Engineering, Kuran, Pune, India
[2]Shivneri Polytechnic Khanapur, Pune, India
[3]JaihindCollege of Engineering, Kuran, Pune, India
[4]Jaihind College of Engineering, Kuran, Pune, India

Abstract: *The Air Driven Engine is an eco-friendly engine which operates with compressed air.An Air Driven Engine uses the expansion of compressed air to drive the pistons of an engine An Air Driven Engine is a pneumatic actuator that creates useful work by expanding compressed air. There is no mixing of fuel with air as there is no combustion.An Air Driven Engine makes use of Compressed Air Technology for its operation The Compressed Air Technology is quite simple. If we compress normal air into a cylinder the air would hold some energy within it. This energy can be utilized for useful purposes. When this compressed air expands, the energy is released to do work. So this energy in compressed air can also be utilized to displace a piston*
Keyword: *Engine, pressure Compressor, Air.etc*

I. Introduction

At first glance the idea of running an engine on air seems to be too good to be true. Actually, if we can make use of air as an aid for running an engine it is a fantastic idea. As we all know, air is all around us, it never runs out, it is non-polluting and it is free.An Air Driven Engine makes use of Compressed Air Technology for its operation. Compressed Air Technology is now widely preferred for research by different industries for developing different drives for different purposes. The Compressed Air Technology is quite simple. If we compress normal air into a cylinder the air would hold some energy within it. This energy can be utilized for useful purposes. When this compressed air expands, the energy is released to do work.

So this energy in compressed air can also be utilized to displace a piston. This is the basic working principle of the Air Driven Engine. It uses the expansion of compressed air to drive the pistons of the engine. So an Air Driven Engine is basically a pneumatic actuator that creates useful work by expanding compressed air. This work provided by the air is utilized to supply power to the crankshaft of the engine.In the case of an Air Driven Engine, there is no combustion taking place within the engine. So it is non-polluting and less dangerous. It requires lighter metal only since it does not have to withstand elevated temperatures.As there is no combustion taking place, there is no need for mixing fuel and air. Here compressed air is the fuel and it is directly fed into the piston cylinder arrangement. It simply expands inside the cylinder and does useful work on the piston. This work done on the piston provides sufficient power to the crankshaft

II. Problem statement

The engine is work with the help of fossial fuel which is produce more amout of the hazardaous gases and pollution which is directly effect on the environment. day by day the population of world is increase due to which vehicles is also increase and the hazardaous gas from vehicles is directly affect on environment to avoid this we developed engine which is work without fossial fuel due to which pollution is absent from engine.

III. Construction and Working

Our air engine works on the same principle of that of an internal combustion engine. The only difference between the two is that in an internal combustion engine; the explosion of fuel in the combustion chamber produces the energy to move the piston, while in an air engine the energy for moving piston is acquired from the supplied compressed air.

The complete assembly of our air engine consists of slightly modified ic engine, valve timing disc attached to the flywheel of the engine, sensor controlled valve mechanism, piping system, gauge system, air compressor and air tank.

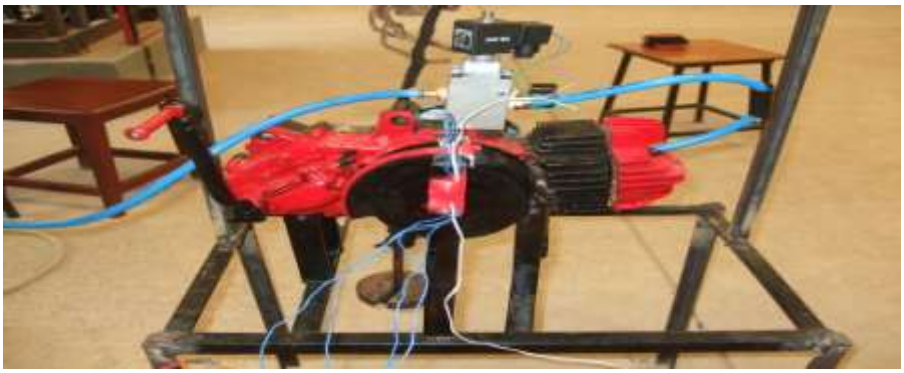

Figure3.1: Working model

For the proper and continues working of the engine the timing with which the compressed air is supplied is of great importance. So in order to make it precise we used sensor controlled valve mechanism. The valve timing disc is made with utmost precision to precise operation of valve. For that the outer dead centre region (ODC) of the piston is found out and is marked on to the fixed valve timing disc. By the same method the point just before the exhaust port opening(EPO) is found out and marked on the disk with the help of a cross sectional change.

For starting; the engine is cranked by the kicker. This will rotate the crankshaft along with the valve timing disk in the clockwise direction. During this rotation the ODC region of the disc cuts the IR beam first and followed by the EPO region.

When the IR beam is first cut by ODC region, the circuit activates the solenoid valve by electric signal. At the moment the valve gets opened and allows the flow of compressed air into the cylinder from the tank through the piping system. The whole region from the point of ODC to EPO on the valve timing disk is opaque and does not allows the IR beam through it. So all the way long the circuit maintains the solenoid valve open by supplying a continuous supply of electric current to the valve. At the same time the compressed air from the tank continues to fill in the cylinder there by pushing the piston further towards the bottom dead centre(BDC). But to increase the fuel efficiency the fuel supply should be cut-off before reaching the EPO.

So when the EPO region of the valve timing disc sweeps past away from between the IR sensors, the IR beam will make connection again. This will cut the supply to the solenoid valve there by closing the valve. This will prevent the valve from being open at the same time of EPO; increasing efficiency.

When the disc rotates further, the valve remains closed throughout the area from the EPO to the ODC as the IR beam is closed. And this cycle continue.

IV. Exprimental Testing

Purpose of testing

Load testing is the process of loading the engine for the purpose of calculating the maximum torque and brake power by a load testing apparatus.

Testing apparatus

For load testing our air engine; we made the testing apparatus our-self consisting of brake drum, spring balance, rope and holding frame.

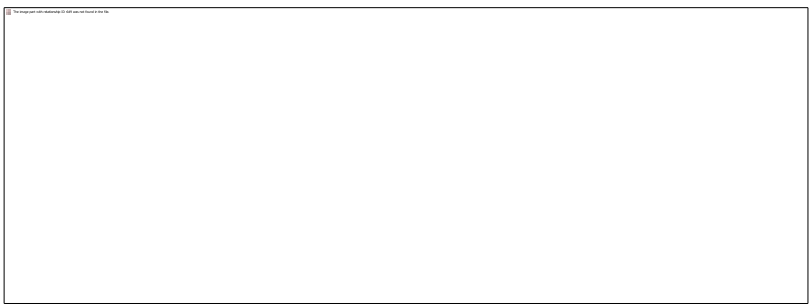

Figure4.1: brake drum

The brake drum of our testing apparatus was made by slightly modifying the clutch disc of our engine itself and coupled it to the crankshaft. The spring balance is held in place to the main frame through a hole drilled into it. The rope is then tied to the hook of the spring balance. The other end of the rope is circled over the brake drum by a single loop in clockwise direction. The weight placing base is attached to the loose end of the rope. Extra care is taken in order to make sure that the spring balance, the rope and the weights are in straight line.

Testing principle

Brake power:Brake horsepower is the measure of an engine's horsepower without the loss in power caused by the gearbox, alternator, differential, water pump, and other auxiliary components such as power steering pump, muffled exhaust system, etc. Brake refers to a device which was used to load an engine and hold it at a desired RPM. During testing, the output torque and rotational speed were measured to determine the brake horsepower. Horsepower was originally measured and calculated by use of a brake drum connected to the engine's output shaft. Brake power is the power produced by the engine as measured by the brake drum.

Specifications of testing apparatus

Diameter of brake drum D=120mm
Diameter of rope d=12mm

Testing procedure

1. Made sure that all the connections were made correctly.
2. Made sure that the valve of compression tank is in closed position.
3. Then the tank is filled up to the required pressure by running the compressor.
4. The electrical circuit is turned on by closing the connection.
5. Made sure that the engine is in no load condition.
6. Then the valve of the compressor tank is opened gradually to the maximum.
7. For the engine to start running it is cranked with the help of the kicker.
8. When the engine starts running and gained speed; no load readings of pressure in BAR as indicated by the pressure gauge on the engine and the speed of the brake drum in RPM as indicated by the tachometer is taken down.
9. This process is repeated for different values of pressure ranging between 1bar and 9bar and the corresponding readings of speed of rotation are noted.
10. The readings thus obtained are tabulated in the tabular column.

Figure4.2: Testing setup

Observations after testing

Weight	Pressure								
	1	2	3	4	5	6	7	8	9
No Load	344	413	456	484	513	533	545	563	588
0.5	314	384	430	450	476	508	516	526	556
1	300	363	412	440	465	480	485	490	530
1.5	210	268	381	400	441	459	469	474	506
2	202	210	374	385	425	450	460	465	475
2.5	-	-	312	332	375	420	436	475	460
3	-	-	300	326	354	363	381	406	438

Performance characteristics

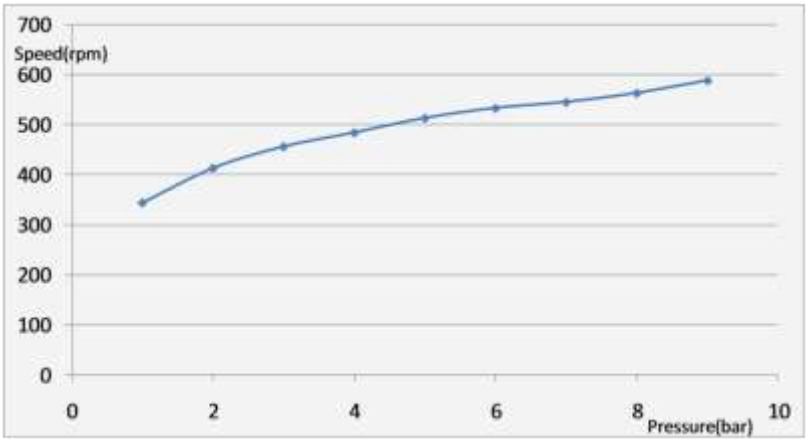

Figure4.3: Speed versus pressure

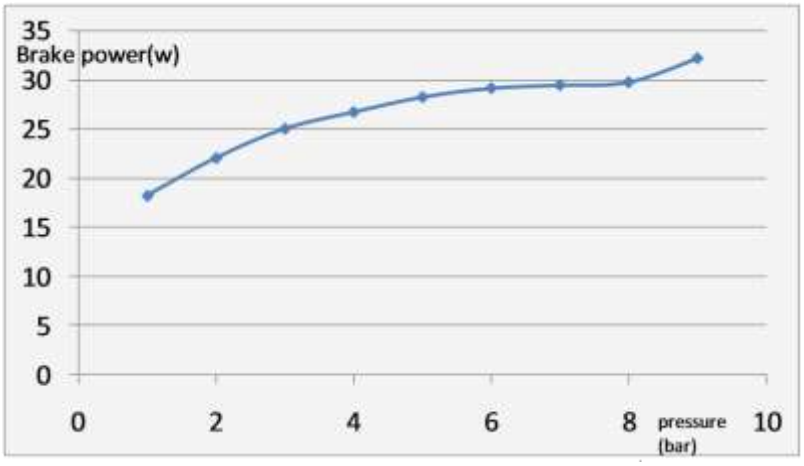

Figure4.4: Brake power versus pressure

In Air Driven Engine, the speed is bound to increase with increase in the inlet pressure. The speed versus torque characteristics shows a negative linear variation. The brake power is observed to increase with increase in the inlet pressure.

V. Summary

We were able to successfully complete the design and fabrication of the Air Driven Engine. By doing this project we gained the knowledge about pneumatic system and how automation can be effectively done with the help of pneumatic system. We were also able to gain practical knowledge about the basics of the normal IC engine and solenoid valves.

The Air Driven Engine provides an effective method for power production and transmission. Even though its applications are limited currently, further research could provide wider applications.

References

[1]. MDIEnterprisesS.A(http://www.mdi.lu/eng/afficheeng.php?page=minicats).Mdi.lu Retrieved 2010-12-12.
[2]. Hugh Currin "Air Engine Design for Machining Class"April 11, 2007
[3]. Bossel U. Thermodynamic analysis of compressed airvehicle propulsion. European Fuel Cell Forum; 2009.http://www.efcf.com/e/reports/E14.pdf
[4]. Thipse S S. Compressed air car. Tech Monitor, 2008,1(2): 33–37
[5]. HE Wei et al. "Performance study on three-stagepower system of compressed air vehicle based onsingle-screw expander" science china, technologicalsciences, August 2010, pp:2299–2303
[6]. J.Gary Wood et al. "Design of a low pressure airengine for third world use" 17th Annual IntersocietyEnergy Conversion Los Angeles, California August,1982
[7]. Ulf Bossel "Thermodynamic Analysis of CompressedAir Vehicle Propulsion" European Fuel CellForum,Morgenacherstrasse 2F CH-5452Oberrohrdorf/Switzerland, April 2, 2009