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DESIGN AND FABRICATION OF COMPRESSED AIR DRIVEN ENGINE

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ABSTRACT

Internal-combustion engines pollute the environment seriously, and consume enormous non-renewable energy. So today the whole world is in search of alternative fuel and there are couples of option of alternative fuel such as solar power, tidal power, geothermal power, etc. and one of them is Compressed Air. The air engine runs on air only, so the need of fossil fuel is completely reduced. This practical study gives a brief description on zero pollution compressed air engines. As we are going to convert the already existing conventional engine into an air powered one, this new technology is easy to adapt and another benefit is that it uses air as fuel which is available abundantly in atmosphere. This technology is cheaper in cost and maintenance and it doesn't cause any kind of harm to the environment. Thus it is surely a revolutionary mode of transport internal combustion engine produces a large amount of harmful gases like CO2, SO2 etc. which pollute the Environment and causes global warming and it consumes enormous non-renewable energy. So today every country is in search of alternative source of energy and there is couple of alternate source of energy such as solar power, tidal power, geo-thermal power, etc. and one of them is compressed air. The air engine runs on air only, no fossil fuel. The engine is modified from 4-stroke to a 2-stroke engine (suction and exhaust) by modification of cam-gear system. The maximum pressure used is 8 bar.. This technology is cheaper in cost and maintenance and it does not cause any kind of harm to the environment. Thus the compressed air engine will play vital role in reducing air pollution and also in reducing temperature of earth. Compressed air engine uses air as fuel which is available abundantly in atmosphere.

Keywords: *Internal-Combustion Engine, Compressed Air, Non-renewable energy, Conventional Engine*

INTRODUCTION

Nowadays the need of energy is increases, but basically conventional source of energy is limited due to that price of petroleum or gasoline is continuously rising. To satisfy our need alternate fuel or energy is required. But whileconsidering alternate fuel some factors be considered as like availability, eco-friendly etc. Also, combustion

products after using them plays an major role in causing global problems, such as the greenhouse effect, ozone layer depletion, acid rains and pollution which are great danger for environment and eventually for the total life on planet and also has the strength to completely destroy the planet at later of its stage so it Is necessary to control it on its Initial stage. Due to these factors leading automobile manufacturers are forced to develop cars fuelled by alternatives energies. Hybrid cars, Fuel cell powered cars, Hydrogen fuelled cars will be soon in the market as a result of it. One of the possible alternatives is the air powered car.

LITERATURE SURVEY

1. S. S. Verma -The compressed air engine is a modified 100cc conventional engine. The engine is modified from 4-stroke to a 2-stroke engine (suction and exhaust) by modification of cam-gear system. The maximum pressure used is 8 bar.[1]
2. Qihui Yu, Maolin Cai - . The results show that the prototype of CAE has a good economic performance under low speed and when the supply pressure is 2 MPa, the maximum output power is 1.92 kW; the maximum output torque is 56.55 N·m; and the maximum efficiency is 25%. This research can be referred to in the optimization of air-powered engine.[2]
3. VishwajeetSingh- Mankind is always looking for efficient and pollutant-free way of powering their machine. Resent development in light and strong material has aided us to achieve those easier ways. In present study a 4 stroke engine was modified into 2 stroke engine, and was used to run on compressed air technology.[3]
4. Saurabh Pathak-, The heavy vehicles are known for producing a large amount of harmful gases like CO2, SO2 etc. which act as the major source for global warming. So research is going on to find a light weight vehicle which does not pollute the environment. One of the alternatives is the use of compressed air to generate power to run an automobile.[4]
5. Pramod Kumar .J-. In this project, an SI engine is converted into a compressed air engine. A four stroke single cylinder SI engine is converted to two stroke engine which operates using compressed air because of its design simplicity[5]

MATERIALS AND METHODS

a).Components of Machine:

The following components are mainly used in Compressed Air Driven Engine

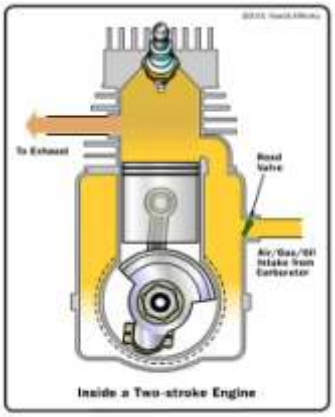
b).Basic Components:

Compressed Air Driven Engine is constructed using the following components:

c).WHEEL**:**

The materials of modern pneumatic tires are synthetic rubber, natural, fabric and wire, along with carbon black and other chemical compounds. They consist of a tread and a body. The tread provides traction while the body provides containment for a quantity of compressed air.

d).Air Engine



A four-stroke engine is an internal combustion engine in which the piston completes four separate strokes while turning a crankshaft. A stroke refers to the full travel of the piston along the cylinder, in either direction.

e).SHAFT

Shaft is a common and important machine element. It is a rotating member, in general, has a circular cross-section and is used to transmit power. The shaft may be hollow or solid. The shaft is supported on bearings and it rotates a set of gears or pulleys for the purpose of power transmission. The shaft is generally acted upon by bending moment, torsion and axial force.

f).Chain and Pulley Drive**:**

For transmission of power from motor to wheels belt and pulley drive is used in the machine and also to drive seed distributer.

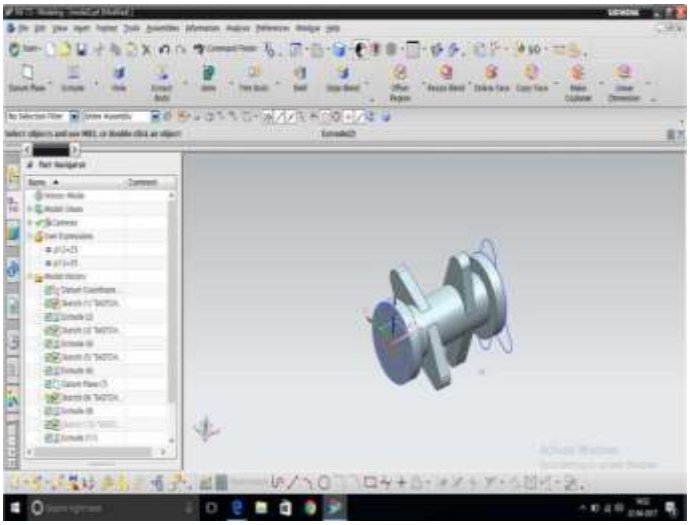
The material used in fabrication of the machine is mild steel grade (MS).

g).BALL BEARING

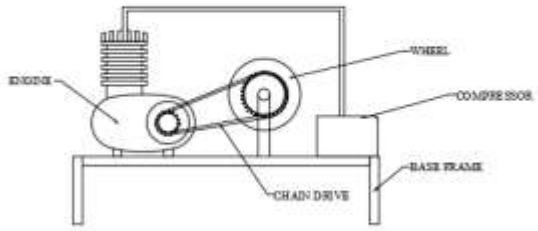
The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least three races to contain the balls and transmit the loads through the balls. In most applications, one race is stationary and the other is attached to the rotating assembly (e.g., a hub or shaft).

DESIGN OF THE MACHINE

In order to develop CAE, we have designed the camshaft with the help of the Unigraphics NX software which is advanced and tightly integrated CAD/CAM/CAE product development solution software. It allows to model solid components and assemblies, to perform engineering analyses, to create tool paths for manufacturing processes and to perform numerous other engineering design activities in single software.



WORKING PRINCIPLE



The base frame which support the engine, usually engines are worked by using burnable fluids and gas but here air is a fuel. Engine where customized with inlet valve that allow the air to enter into the engine. a chain sprocket is coupled with the engine that is used to transmit the power and the gear is connected with another gear this connection is made by using chain drive so the power transmission is transfer to the wheel. a compressor is mounted on the frame so that can give air to the engine. A compressed air which activate the engine to rotate.

CONCLUSIONS

The paper presents the theoretical concept of designing an engine which can run on compressed air technology. Here the theoretical concept was also experimentally proved by modifying a 4-stroke engine into a 2-stroke engine and running the engine by proposed compressed air. Further the experimental result was presented which showed the advantages of using CAE. Thus, A CAE give a possibility to use the unlimited resource of air as a fuel to run the engine. The proposed concept design of CAE helps in solving the problem using a fuel which is renewable and at the same time cheaper in use.

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REFERENCES

1. S. S. Verma, Latest Developments of a Compressed Air Vehicle: A Status Report, Volume 13 Issue 1 Version 1.0 Year 2013
2. . Yu, Q.H. and Cai, M.L. (2015). Experimental analysis of a compressed air engine.Journal of Flow Control, Measurement & Visualization, 3, 144-153. Retrieved from.2015.34014 Zang, B., Liu, M., Li, Y., Wu, L. (2013). Optimization of an industrial air compressor system.Energy Engineering, 110 (6), 52-62..
3. Vishwajeet Singh, "Compressed Air Engine"; International Journal of Scientific and Research Publications, Volume 7, Issue 7, July 2017 403 ISSN 2250-3153

4. Saurabh .P made a review on compressed air vehicles, IJMPE | ISSN: 2320-2092, Vol 2,Issue 4, pp 9 – 13(4)
5. J. Pramod Kumar., Developed Air Powered Engine, IJMET | ISSN 0976-6359, Vol 7,Issue 2 pp 66 – 72
6. Tejshree Bornare, Abhishek Badgujar and Prathamesh Natu, Vortex Tube Refrigeration System Based on Compressed Air, International Journal of Mechanical Engineering and Technology, 6 (7), 2016, pp. 99 – 104
7. . Harshal D. Shirodkar and Dr. S.B.Rane, Structural Optimization of A Powered Industrial Lift Truck Frame, International Journal of Mechanical Engineering and Technology, 5(10), 2014, pp. 45–56
8. Brown, T. L., Atluri, V. P., and Schmiedeler (2014). A low-cost hybrid drivetrain concept based on compressed air energy storage. Applied Energy, 134, 477-489.
9. Edelstein, S. (2015, February 13). Tata airpod compressed-air car to launch in Hawaii this year: Report. Green Car Reports, 1-3
10. Hanlon, M. (2004). Significant new rotary engine design runs on