Experimental Investigation Of Compressed Air Engine: A Review

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Abstract. This paper describes the compressor engine analysis for the design and production of single cylinder engines that can be powered by compressor. With a few changes that are the main objective of the research, the existing four-stroke single cylinder engine (bikes / moped) can be driven on compressed air. Using a pump, compressed air is packed with energy. When measuring total efficiency, the energy demand for compressing air has to be considered. The compressed air vehicle can, therefore, lead to the elimination of air emissions and tend to have zero levels of pollution and foster a great climate. The key benefit of this engine is that no hydrocarbon fuel is required, meaning that no combustion process takes place.

Keywords — compressor, camshaft, piston, air engine, cooling system, modification of engine

1. Introduction
Steam stored in a tank is controlled by an engine controlled by a compressor. Instead of combining air with gasoline and moving motors with heat growing fuels, it utilises air expansion to move the pump, as in traditional I.C. that machine. It is also possible to use gas engines to generate potential power through pressurised steam.

In the 1880s and 1890s, air turbines were first designed on an experimental basis by firms of inventors and aircraft engineers [1]. At that period, steam locomotive companies routinely built mining motors. The hydraulic railway concept emerged in the 1820s, About the same direction as new hybrid metro trains. The source of electricity provided a steady flow of air from tubing placed all across the lane. However, due to material constraints at the time, this was not feasible.

From 1886 to 1900 [2] has been used for road movement. For expansion, it was a single stage motor which made air cars possible. Even prior to joining the car, this car implemented the idea of shifting the combination after exiting the vehicle. Surplus heat was obtained by moving the air into the hot water tank, resulting in an extended vehicle range between two fill-ups in a row. Hardie engineered a more modern version of the Mekarski engine, which was in use from 1892-1900 in New York. He attempted to use air reheating using a compressor coupled using regenerative breakage, thus supplying rivers with extra energy and air. In the engine, limit switches were mounted to guarantee that the electric motor worked at create competition.

The alteration of the 4 stroke petrol engine in this paper specification is modified in such a way as to create a 2 stroke compressed air engine. This essay also mentions the need for an air-powered system, several different engine mechanics, their parallels, scientific results, technical principles that maximise
performance, a practical approach to hydraulic actuators or to other emerging energies in parallel. An effort is made at the outset to map out possible study paths and prospective fields of usage. The goal of this research is to recognize recent developments in aerial support engineering, to evaluate the feasibility and to provide a practical contrast among current and potential solutions.

2. Materials And Methods

Much theoretical studies and calculations on reciprocating piston air engines was carried out. The 4-stroke 100 cc petrol engine was adapted as a two-stroke compressed air engine in this work. The ideal two-stroke thermodynamic operation is done in the following way: at the beginning of the intake stroke, the intake valve opens immediately, the exhaust valve remains closed as well as the piston moves from TDC to BDC, which is also the mechanical power of the engine. The intake valve shuts before the piston reaches BDC to reduce the cost of production absorption and, with this action, the expansion process changes from relentless pressure growth to exchanger extension. The exhaust valve immediately at the start of the combustion chamber, while the incoming one stays closed. From BDC to TDC, the piston moves. After TDC, the valve will close to block isotropic pressure. It is, however, not possible in a real situation to replicate exactly the very same loop, Which results in a cap. Valve systems have been altered to open the intake valve at a rotating machine under 0 ° and to shut down entirely at a rotating crane of 150 ° c, whilst the outlet valve unlocks at a rotation of 170 degrees and shuts down completely at a rotating of 360 degrees. However, the torque is stronger than that of the original I.C. It was an engine, but the fuel was much smaller. By introducing wider valve openings, improving more scheduling for steam turbines and integrating ignition timing systems, this can be enhanced.

3. Working of compressed air engine

Most After modification the air engine has two strokes as follows
1. Power stroke
2. Exhaust stroke

3.1. Power stroke:

In an air engine, only one valve is open. Under high pressure, the air fills the cylinder to move the piston to the centre. To power the air engine, we need 4 bar pressure and we need 1.5 bar pressure to turn the engine off.

3.2. Exhaust stroke

Throughout this stroke, the spark plug is in an open position and the control in a closed position. The fluid flows to the bottom right at the bottom, to the dead centre at the top. The ignition is lacking from inside the cylinder. [5] The air motor is changed from a four-stroke to a two-stroke engine. After modifying the engine it be tested for either it is successful or not. For that they make a some testing’s for this engine. The modified air engine was experimentally tested by two cylinder piston compressor at varied values of air pressure. After getting an experimental report of air engine they decided air engine is successfully working. [6]

For developing compressor air engine they designing new model cam shaft suitable to modified engine. For designing camshaft they used unigraphics NX software which is tightly connected with CAD/CAM for product development software. This design software makes a solid components and analysis and assembling and to create to tool paths to manufacturing the designed parts. The four stroke engine camshaft wont suitable to two stroke modified engine.so they modified the camshaft as
per requirements of modified air engine. Before modification the shape of camshaft in conventional engine is V-shaped but after some modification of camshaft shape looks I. [7]

Air engine is using compressor technology for running the machine because it is eco-friendly and no need cooling system. This compressor technology is using to improve the many industrial engines. On this technology the researchers concentrating more because air cheaply available and it won’t affect the environment. In air compressor engine there is no combustion takes place. And need of sparkplug for this air compressor engine. so it is non-polluting the nature and if we use this technology to vehicles the vehicle be light weight and air is used as a fuel for this engine and air is renewable energy. [8]

Compressed air engine was designed and manufactured with the help of easily available materials. After fabricated they tested the air engine with some experimental analysis. Finally they prove the engine is working with good performance. Selected good suitable materials for manufacturing the compressed air engine. [9]

4. Conclusion

It is noted that less output power can be caused by less available air saturation time as well as the pneumatic cylinder small quantity ratio from the engine-powered pressurised gas. It can be accomplished to provide an extended spreading compensation to stop the piston at the top dead core for longer length, which can be accomplished by using incorporated linking rope or by coordinating proportioning valve. The supply of pressurised gas for optimum output at steady demand over a service cycle is another concern to resolve. Then again, one of the most interesting fields is the successful redirection and refining of pressurised gas to performance report.

5. References

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