Compressed Air Engine: A Review Study

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Abstract—this paper is reports on the review of compressed air engine for the design and development of single cylinder engine which can be run by the compressed air. Current four strokes single cylinder engine (bikes/moped) can be run on the compressed air with a few modifications that are the main objective of the study. Compressed air filled by electricity using a compressor. The electricity requirement for compressing air has to be considered while computing overall efficiency. Nevertheless the compressed air vehicle will contribute to reducing air pollution and tend to zero pollution level and promoting great environment. Main advantage of this engine is that no hydrocarbon fuel required means no combustion process is take place.

Keywords—Air Tank, Pressure Control Valve, Fuel Injector and 4-stroke Single Cylinder Engine.

I. INTRODUCTION

Large amount of petroleum based fuel are used is Internal Combustion Engine (ICE). Then after IC engine “CAE” was introduced. An engine which will use compressed air to run the engine. It is low cost operated as compared to fossil fuel as it uses air as fuel, which is easily available in environment. There are several technical benefits of using this engine, there will be no combustion taking place inside the cylinder, the working of CAE engine temperature is low compared to normal IC engine. This helps in reducing wear and tear of the engine components. There is no possibility of knocking. This in turn results in smooth working of engine. The additional benefits are that there will be no need for installing Cooling system and complex fuel injection systems as there no fuel is to be used. This makes the design simple. There is no combustion takes place, so it results in smooth working of the engine with minimum maintenance. According to this point of view we made compressed air engine which is run on compressed air. This is easily available from the atmosphere and with zero emission. It’s also improving urban life style through sustainability & non-polluting vehicle. Its impact on the environment is also considered low. It good with intelligence, lighter, style and comfort.

II. COMPONENTS DETAILS

A. Two Way Direct Acting Solenoid Valve

- Two way direct-acting solenoid valves can be used in many ways. It is delivered with brass or stainless steel bodies for a wide range of orifices and connections.
- These valves can be basically classified as Normally Closed or Normally Open based on the valve condition when the solenoid is energized.

B. Modified Cam

- Replacement cam with a modified cam. This is to be done, so that both the inlet and outlet close at same time.
- Also this will result in conversion of 4 stroke engine into 2 stroke air engine, which in turn gives us the benefit of low mean effective pressure requirement in addition to other operational benefits.

C. Air Injector

- Air injection is a method of reducing exhaust emissions by injecting air into each of the exhaust ports of an engine so that air mixes with the hot exhaust and oxidises HC and CO.
• Air injector directly inject the oppressed air inside the engine.

D. Two Stroke Modified Compressed Air Engine

• In this compressed air engine inlet valve is permanently closed, because the compressed air is passes from the injector. The compressed air which is enter through the injector inside the engine it’s give some movements from external motion and then piston moves from TDC to BDC.
• When the piston moves from TDC to BDC in this process power was generates inside the SI engine and it’s called power stroke. After that pistons moves from BDC to TDC in this process exhaust was generated and it’s called exhaust stroke. This way compressed air engine work on only two strokes and this process is going on.

III. PROCESS DESCRIPTION

To convert a conventional IC (four stroke petrol) engine into an Air Powered one, few components are to be replaced.
• Replace the spark plug with a pulsed pressure control valve which can create required pressure.
• Replace fuel tank with air vessel, as engine requires pressurized air as input.
• Replace cam with a modified cam. This is to be done, so that both the inlet and outlet valves open and close at the same time.

IV. WORKING

The working of compressed air engine needs various components. The main components that we are used as follows:

• Air tank
• Pressure Control valve
• Fuel Injector
• 2-stroke Single cylinder SI engine

At first compressed air is passed from the air tank through the flexible pipe. With air tank Pressure control valve is connected, so we can control the flow of air pressure which goes into the engine. The flexible pipe connects with the injector which is already fixed into the modified 2-stroke single cylinder SI engine. In this compressed air engine inlet valve is permanently closed, because the compressed air is passes from the injector. The compressed air which is enter through the injector inside the engine it’s give some movements from external motion and then piston moves from TDC to BDC. When the piston moves from TDC to BDC in this process power was generates inside the SI engine and it’s called power stroke. After that pistons moves from BDC to TDC in this process exhaust was generated and it’s called exhaust stroke. This way compressed air engine work on only two strokes and this process is going on.

V. FUTURE SCOPE

• Reduction of diameter of piston improves volumetric efficiency
• In future same development is carried out is dual energy.
• Use compressor motor to restore compressed air into the air tank.
REFERENCES


