PNEUMATIC VECHICLE

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Abstract:-The current state of the world explains, the difficulty of the problem of fuel and pollution, as well as, common sources they are about to end in the near future. So, search for something else fuel is continuous and much needed. Today there are several solutions to meet the needs of a better fuel economy and one of to them the concept of spiritism. The project is focused in a hybrid car driven by the wind as another fuel source as well rechargeable battery, reducing normal dependency sources. In this case, compressed air is stored in the storage tank /electrical pressure. This is a pneumatic-hybrid fire not only eco-friendly, pollution free but also very economical. Test Analysis to improve Hybrid Pneumatic A car that operates in compressed air. The car is powered by compressed air engine and can later be converted to batteries. The car uses fuel that can be recycled and polluted. The Pneumatic Vehicle is an air actuator that generates assistance work by increasing the air pressure. When the air is pressed it expands, releases the power to do the job. So this power is in compressed air can be used to remove the piston.

1. INTRODUCTION

The society of today relies to a great extent on different means of transportation. This massive travelling is a heavy load on nature. The cars that increase in numbers every day emit toxic emissions on the highways and the airplanes consume huge amount of fossils fuels. In recent years the awareness of the effect of pollution on the environment and climate has increased. The exhaust emissions standards are getting more and more stringent and there now exists a discussion about the introduction of a mandatory emissions standard for CO2, a greenhouse gas that contributes to the climate change which is an issue of growing international concern. This demand for lower exhaust emission levels together with increasing fuel prices leads to the demand of combustion engines with better fuel economy, which forces engine developers to find and investigate more efficient engine management

2. LITERATURE REVIEW

N.A. Todkar et. al.[1] the technology of compressed air vehicles is not new. In fact, it has been around for years. Compressed air technology allows engines/ motors that are both non-polluting and economical. We designed 3 wheeled vehicles in order to reduce weight. Unlike conventional transmission systems which include clutch, counter shaft, fly wheel, propeller shaft, differential, the pneumatic motor has been connected and coupled to the rear wheel with the use of an intermediate gear box reducing transmission losses and weight of the vehicle. It also occupies lesser space compared to a four wheeler. But in-depth research is required to completely prove this technology for its commercial as well as technical viability.

Franco Antony et. al.[2]for working of an air engine two stroke engine technologies is needed. But the market is now dominated with four stroke engines. So in our project we took a four stroke petrol engine and with some modifications made it into a two stroke air engine. The engine camshaft rotates once for every two rotations of flywheel. For a two stroke it needs one rotation of camshaft for a rotation of the Modified flywheel and for that there must be opening of both inlet and exhaust valves. Alteration of the cam profile with double cam means, for one rotation of camshaft the both valves will open twice. This is done because in a four stroke engine, for two flywheel rotation the camshaft rotates once. So we modify cam profile so that two lift is possible for both inlet and the exhaust sides. Thus for first quarter of a rotation of the camshaft we get power stroke, next quarter exhaust, third quarter again power stroke and fourth again exhaust. This design is adopted by here since there will be no further modifications required in timing gears and cylinder head is needed to accommodate the design. Thus only work to be done is reduced to cam profile.

A compressed air vehicle is powered by an air engines, using compressed air, which is stored in a tank. Instead of mixing fuel with air and burning in the engine it to drive pistons with hot expanding gases; compressed air vehicles (CAV) use the expansion of compressed air to drive their pistons. The use of that air in the engine is 90 per cent efficient. The principle of the air engine is derived from the steam engine in which the pressure energy of steam is converted to kinetic energy. The air engine uses compressed air instead of steam. The compressed air has pressure which on expansion moves the piston (linear motion) which is converted to rotary motion through crank and connecting rod mechanism. In the compressed air engine, the cycle of operation gets completed with two strokes of the piston or one revolution of the crank. The two strokes are:

i. Expansion or Power stroke,
ii. ii. Exhaust stroke

3. MATERIAL SELECTION

Components and Materials –

Piston-Cylinder: A piston is a component of reciprocating engines, reciprocating pumps, gas compressors and pneumatic cylinders, among other similar mechanisms. It is the moving component that is contained by a cylinder and is made gas-tight by piston rings. The main function is force is

transferred from the crankshaft to the piston for the purpose of compressing or ejecting the fluid in the cylinder. The pneumatic piston-cylinder materials can be chosen upon job specification. Material range from nickel-plated brass to aluminum, and even steel and stainless steel. Depending on the levels of loads, humidity, temperature, and stoke lengths specified, the appropriate material may be selected. –

Compressor:
It is a device that converts power into potential energy stored in pressurized air. An air compressor forces more and more air into a storage tank, increasing the pressure. When tank pressure reaches its upper limit the air compressor shuts off. The compressed air, then, is held in the tank until. Called into use. The energy contained in the compressed air can be used for a variety of applications, utilizing the kinetic energy of the air as it is released and the tank depressurizes. When tank pressure reaches its lower limit, the air compressor turns on again and re-pressurizes the tank.

Storage Tank:
They are containers that hold liquids, compressed gases or mediums used for reservoirs, and for manufactured containers. Storage tanks are often cylindrical in shape, perpendicular to the ground with flat bottoms, and a fixed or floating roof. There are usually environmental regulations applied to the design and operation of storage tanks, often depending on the nature of the fluid contained within. While steel and concrete remain one of the most popular choices for tanks, glass-reinforced plastic, thermoplastic and polyethylene tanks are increasing in popularity. They offer lower build cost and greater chemical resistance. There are several standards, such as British standard 4994, DVS (German Welding Institute) 2205, and ASME which give advice on wall thickness, quality control procedures, testing procedures, accreditation, fabrication and design criteria of final product.

- Pressure Regulator:
A pressure regulator is a valve that automatically cuts off the flow of a liquid or gas at a certain pressure. Regulators are used to allow high-pressure fluid supply lines or tanks to be reduced to safe and usable pressures for various applications.
Control Valve:

They are used to control conditions such as flow, pressure, temperature, and liquid level by fully or partially opening or closing in response to signals received from controllers that compare a set point to a process variable whose value is provided by sensors that monitor changes in such conditions. Control Valve is also termed as the Final Control Element. A control valve consists of three main parts in which each part exist in several types and designs: Valve's actuator, Valve's positioned, Valve's body.

Battery:
4 Batteries of 12V 24 Amps are used for Vehicle. Electric Bike Battery these are highly used in Sightseeing Bus, EV and HEV. These batteries are environment friendly and safe to chargeable. It use for the hybrid vehicle to electric power.

4. CALCULATION

• Minimum required pressure to run engine = 4 bar
• Maximum speed of engine at no load condition = 1,500 rpm
• Maximum speed of engine at load of 3kg on dynamometer = 700 rpm Load, m Frictional Force is;
F= m*g*u

Where, F = 150 kg Gravitational force, g = 9.81 Coefficient of friction between wheel and road, u = 0.6 882.9 N
Required Force=
Where, diameter of piston, d = 0.06 m Pressure, p = 6.5 F = 1,837.83 N, (which is more than frictional force, so it allows vehicle to run)

Calculation of Power;
P=f*v
Where, velocity, v = 1 Force, F = 1,471.5 N P = 1.5 kW, this power is required to drive the motor.

5. APPLICATION

- Offices, institutions, industries etc, can use the vehicle for smaller to and fro movements.
- The system eliminates the need for fuel, making it eco-friendly and pollution free, thus can be used for personal as well as commercial use.
- No conventional fuel is needed except the use of batteries for initial thrust and speed, hence has more life and less costly.

ADVANTAGES

- Also light in weight (approx 200 kg) due to use of composite material, with attractive looks.
- In conjunction with compressed air it also runs on batteries.
- The pneumatic vehicle is equipped with a range of modern systems. For example, one mechanism stops the engine when the vehicle is stationary i.e. at traffic lights, junctions etc. Unlike conventional vehicle, the engine does not operate in traffic jams, which thus saves on fuel.
- Another interesting feature is the pneumatic system. When the vehicle brakes, the kinetic energy from braking is used to drive a pump that helps to restore some of the lost pressure.

OVERALL REAL COSTING OF VEHICLE
Since, the Pneumatic Vehicle uses only air as the fuel, the cost of the fuel will not be there as air is abundantly available. Further, the costs involved to compress the air to be used in a vehicle are inferior to the costs involved with a normal combustion engine. Air is abundant, economical, transportable, storable and most importantly, non-polluting. The technology involved with compressed air reduces the production costs of vehicles with 20% because it is not necessary to assemble a cooling system, a fuel tank, spark plugs or mufflers. Pneumatic Vehicles are having lower initial cost than battery electric vehicles when mass

produced. Pneumatic air is not subject to fuel tax. The cost of the carbon-fibre tank having capacity of 90 meter cube is around Rs. 180,000. According to an agreement between Tata Motors and MDI, a Pneumatic Air Car named Air-Pod was costing around Rs 6 Lakhs.

6. CONCLUSION

The pneumatic-hybrid vehicle is one of the treasures to automobile industry. It promises a better combination of different power sources along-with contribution to the field of green technology. The air-hybrids are easy to manufacture and can be easily driven without any carbon footprints. So, for a better tomorrow, pneumatic-hybrid has its role. Thus, for green technology, pneumatic-hybrid is a boon. This achievement is a major break-through in battle to create greener and cheaper motoring. The result is new low-cost pneumatic-hybrid which significantly cuts emission of carbon-dioxide. Existing green-hybrid cars such as Toyota Prius and Honda-Insight use petrol engine and braking energy to generate onboard electricity to give supplementary power to the vehicle. Our vehicle uses similar principle, but instead there is no scope of entering of braking energy and can be worked in future. Thus, an efficient greener technology is guaranteed for the future with our project.

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