

# A STUDY ON AIR POWERED MOTORCYCLE

Ajinkya Pradip Deshpande<sup>1</sup>

<sup>1</sup> Department of Mechanical Engineering, School of Engineering & Technology, Sandip University,

Nashik, Maharashtra, India.

## ABSTRACT

Presently in Taiwan, there are greater than 13 million bikes, on the whole pushed with the aid of internal combustion engines, and the pollutants, carbon monoxide (CO) and unburnt hydrocarbons (HC), generated by motorbike are liable for more than 10% of the air pollutants released to the ecosystem. The research show that the internal combustion engines of motorcycles may additionally generate up to 2 times more pollutants than those of automobiles. Which will enhance the air pollution circumstance and cast off the pollutants laborious, this paper presents a brand new idea of using compressed air as the energy sources for bikes in place of an inner combustion engine, this motorcycle is prepared with an air motor, which transforms the power of the compressed air into mechanical motion electricity. A prototype is built with a fuzzy common sense velocity controller and examined on the actual road. The test records suggests that the velocity error is within 1 km/h and the efficiency is above 70% for this gadget while the velocity is over 20 km/h.

**Keyword:** - Compressed air, air motor, power, motion, energy, velocity.

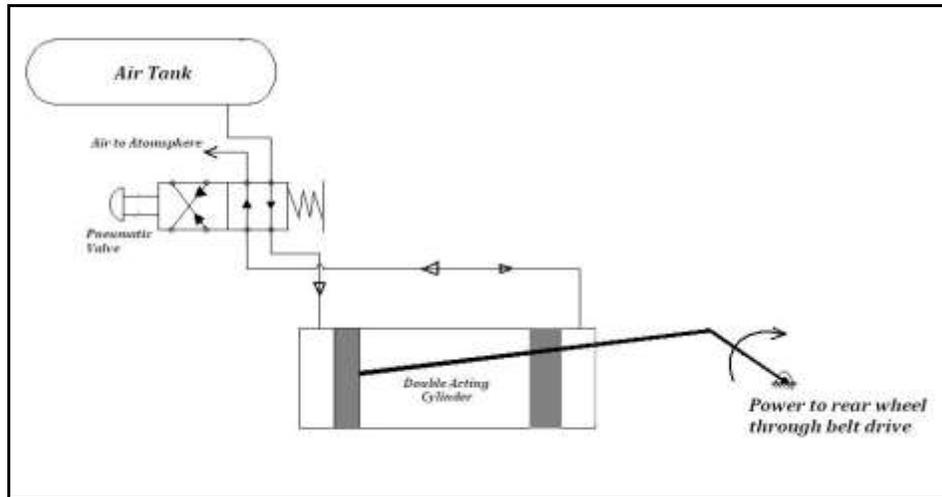
## 1. INTRODUCTION

The air pollutants, recently believed because the purpose for causing the global warming and dramatic climate alternate of the earth, has been an intense trouble for many years. One major source of the air pollutants is generated by means of burning fossil gas thru the internal combustion engines for transportation automobiles. There are essentially three forms of pollution constructed from cars: unburnt choose from over 2,000 fashions locate over 2000 cars at the bottom expenses handiest at Ola vehicles by now. OLA vehicles Open hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx).As an infamous instance, the bikes are the maximum famous transportation car in Taiwan with general amount greater than 13 million.

Compressed air is the air stored under a stress this is more than atmospheric stress. It serves many business purposes. Growing nations like India and China faces excessive gas crisis. Now there is a time to use non-conventional resources. These elements are leading motorbike manufactures to increase motorcycles as gas alternative energies. Fee is not the simplest trouble with the use of gas but it also damages to the environment. It'll finally run out. One viable alternative is Air Powered vehicles. It's far hard to believe that compressed air can be used to power cars. But this is proper and "air cars" because it popularly knows has stuck the attention of research international. It has zero emission and is ideal for town riding circumstance. Compressed air is favourable due to an excessive strength density, low toxicity, fast filling at low value and lengthy carrier life.

A compressed-air car (CAV) is powered by way of an air engine, using compressed air, which is saved in a tank in place of mixing fuel with air and burning it in the engine to power pistons with warm increasing gases, compressed-air motors use the growth of compressed air to pressure their pistons.

## 2. DESIGN



**Fig -1:** Basic Design

Air power bike mechanism consist of following instrument:

1. Air Tank.
2. Pneumatic Valve. (Two Position, Four way)
3. Pneumatic Pipes.
4. Double acting Pneumatic Cylinder.
5. Simple belt drive

### 2.1. Air Tank:

It's far the reservoir of the compressed air. Air at rated stress and of required volume stuffed within the tank. It is critical part of overall system. The most velocity and most quantity of cycles accomplished by way of engine are ultimately controlled through the most pressure that tank can preserve and volume of air under that most strain may be filled in tank. It is also provided with protection valve that may blow off air which creates stress above designed level. A success layout of ordinary gadget is well controlled through layout of air tank.



**Fig -2:** Air Tank

### 2.2 Pneumatic Valve:

A 4 way two role Pneumatic valve is used to govern and manual the drift of pressurized air. Valve includes 4 ports as proven in parent. In one position it lets in the pressurized air to enter on one aspect of cylinder while other low strain side of the piston air is allowed to bypass out of cylinder even as in different role valve allows the pressurized air to go into the opposite side of piston creating stress on that facet and opposite facet piston air is permitted to exit of the cylinder.



Fig -3: 4x2 valve

### 2.3 Pneumatic Pipe:

This pipe consists of pressurized air from air tank to attach it to valve and cylinder. Those pipes are usually bendy and manufactured from plastic material up to thickness to withstand designed strain.



Fig -4: Pneumatic Pipe

### 2.4 Double acting Pneumatic Cylinder:

The compressed air is allowed to expand in cylinder to convert the air pressure into usable pressure. Double acting cylinder allows air to expand on both facets of the piston. Pressure performing on each facet of the piston is unique even though the stress on both side be the equal due specific place.

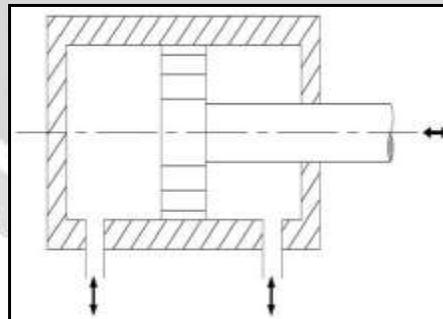


Fig -5: Pneumatic Pipe

### 2.5 Simple Belt Drive:

The Power from the piston is then transfer to the crank which in turn rotates it. Electricity from this can be transferred to wheel of the motorbike or bicycle.

### 3. WORKING:

The excessive strain (designed) air is stuffed inner a stress tank /Air tank. This air is essentially offers the driving pressure to the piston. Air from pressure tank is made to drift via four way 2 function pneumatic valve. This valve basically manipulate the waft of high pressure air to the cylinder. In a single position it lets in the high stress air to glide on ahead facet of piston interior a cylinder while as air from returned aspect is allowed to bypass to ecosystem. because of this piston travels from one cease to some other piston which got here to another end pushes the pneumatic valve to change its position because of alternate in position of valve now air drift is going to again aspect & pushes piston again to return to preliminary role. This motion of piston again releases the pneumatic valve to alternate its position and in this manner piston movement of to & from is achieved. Piston rotates crank thru connecting rod & energy from this crank is given to wheel through belt or chain pressure.

### 4. CALCULATIONS:

100 kg. Average weight of Person

$$100 * 9.87$$

$$= 987 \text{ N}$$

Max. Speed = 40 Km/h

$$40000 \text{ m} / 3600 \text{ sec.}$$

$$= 11.11 \text{ m/s}$$

$$P = 987 * 11.11 \text{ N.m / s}$$

$$(1) P = 10.965 \text{ KW}$$

$$P = 2\pi NT / 60000$$

(For N = 500 rpm)

$$10.965 = 2 * 3.14 * 500 * T / 60000$$

$$T = 209.41 \text{ N.m}$$

$$(2) T = F * r$$

$$209.4 = F * 30 / 1000$$

$$(3). F = 6980.5 \text{ N}$$

$$F = Pr * A$$

$$F = pr \pi (d1$$

$$2 - d2$$

$$2) / 4$$

Where,

d1 = full bore piston diameter (m)

d2 = piston rod diameter (m)

$$6980.5 = Pr * (\pi / 4 [(100/1000)^2 - (20/1000)^2])$$

$$Pr = 6980.5 \text{ N} / 0.00753$$

$$(4) Pr = 9.25 \text{ bar}$$

$$(5) \text{Max. Pressure} = 9.25 \text{ bar}$$

### 5. RESULTS:

- From above calculation we can say that the air tank with most pressure is around 9.25 bar.
- With 40km/h velocity we should capable of get energy 10.96KW which is enough for low distance tour.
- For identical electricity we want to get 209.forty one N. m torque. To obtain equal torque, required pressure need to be 6980N.

### 6. CONCLUSION:

From this mechanism it has been concluded that this device is much less toxic, 0 emission & cheaper than different gasoline options. However to cover extra distance we need lot greater quantity of air than petrol. Its pace is simply too low as in comparison with fuel though for shorter distance Air motorbike is the excellent option instead of gas.

**REFERENCES:**

- [1] Haisheng Chen et al. "Air fuelled zero emission road transportation: A comparative study", Applied Energy 88 (2011), 24 June 2010, pp: 337–342
- [2] Amir Fazeli et al. "A novel compression strategy for air hybrid engines", Applied Energy 88 (2011), 8 March 2011, pp: 2955–2966
- [3] R. S. Khurmi, J. K. Gupta "A Textbook of Theory of Machines", S.Chand Publications.
- [4] Ulf Bossel "Thermodynamic Analysis of Compressed Air Vehicle Propulsion" European Fuel Cell Forum, April 2, 2015.
- [5] Thipse S.S - Compressed air car. Tech Monitor, 2008, 1(2): 33–37
- [6] R.K. Rajput (2015) "A Textbook of Non-Conventional Energy Sources and Utilization", S. Chand Publications, pp: 39-46.
- [7] Miller, W.S., Zhuang, L., Bottema, J. & Wittebrood, A.J. (2000)." Materials Science and Engineering", A 280(1). 37-49
- [8] D. P. Kothari, K.C. Singal (2015) "Renewable Energy sources and Emerging Technologies", PHI Publications, pp: 92-98.

