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# Design and Fabrication of Compressed Air Bicycle

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## Abstract -

*This Project is more about advancement traditional bicycle into a Compressed air bicycle with pneumatic aid which significantly reduces the muscle power taken by the driver and also sustain the momentum for a longer time. Sustainability of momentum is the prime focus of pneumatic power used to drive the sprocket wheel resulting in less frequently pedaling by the driver. There is an additional sprocket wheel that is modified and causes all major changes which are needed to establish the system. The sprocket wheel is rotated with the aid of a pneumatic double-acting cylinder arrangement powered by compressed air The reciprocating motion of the piston in the cylinder causes the rotary motion of the sprocket wheel. The sprocket wheel drives the rear wheel with the aid of a chain.*

***Key Words***: **Compressed Air Tank , Eco-friendly, Low Running Cost , Air Bicycle , Compressed Air Vehicle.**

## 1.INTRODUCTION

Fossil fuels (i.e., petroleum, diesel, natural gas and coal) which meet most of the world's energy demand today are being depleted rapidly. Also, their combustion products are causing global problems, such as the greenhouse effect, ozone layer depletion acid rains and pollution which are posing great danger for environment and eventually for the total life on planet. These factors are leading automobile manufactures 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 possible alternative is the air powered vehicle. Air, which is abundantly available and is free from pollution, can be compressed to higher pressure at a very low cost, is one of the prime option since atmospheric pollution can be permanently eradicated. Whereas so far all the attempts made to eliminate the pollution has however to reduce it, but complete eradication is still rigorously pursued. Compressed air utilization in the pneumatic application has been long proven to use as the following purpose, Air motors, pneumatic actuators and others various such pneumatic equipment's are in use. Compressed air was also used in some of vehicle for boosting the initial torque.

### 1.1 The history of compressed air vehicle

- The first compressed-air vehicle was devised by Bompas, a patent for a locomotive being taken out in England in 1828. There were two storage tanks between the frames, with conventional cylinders and cranks. It is not clear if it was actually built. (Knight, 1880)
- The first recorded compressed-air vehicle in France was built by the Frenchmen Andraud and Tessie of Motay in 1838. A car ran on a test track at Chaillot on the 9th July 1840, and worked well, but the idea was not pursued further.
- In 1848 Barin von Rathlen constructed a vehicle which was reported to have been driven from Putney to Wandsworth (London) at an average speed of 10 to 12 mph.
- At the end of 1855, a constructor called Julienne ran some sort of vehicle at Saint-Denis in France, driven by air at 25 atmospheres (350 psi), for it to be used in coal mines.
- Compressed air locomotives were used for haulage in 1874 while the Simplon tunnel was being dug. An advantage was that the cold exhaust air aided the ventilation of the tunnel.
- Louis Mékarski built a standard gauge self-contained tramcar which was tested in February 1876 on the Courbevoie-Etoile Line of the Paris Tramways Nord (TN), where it much impressed the current president and minister of transport Maréchal de MacMahon. The tramcar was also shown at the exhibition of 1878 as it seemed to be an ideal transport method, quiet, smooth, without smoke, fire or the possibility of boiler explosion.
- The compressed-air locos were soon withdrawn due to a number of accidents, possibly caused by

icing in the pipes of the brakes, which were also worked by compressed air.

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## 2. COMPONENTS

The major components of our Compressed air bicycle consist of:

2.1 COMPRESSED AIR TANK
2.2 PNEUMATIC AIR TOOL
2.3 PRESSURE GAUGES
2.4 BATTERY
2.5 COMPRESSOR


### 2.1 Compressed air tank

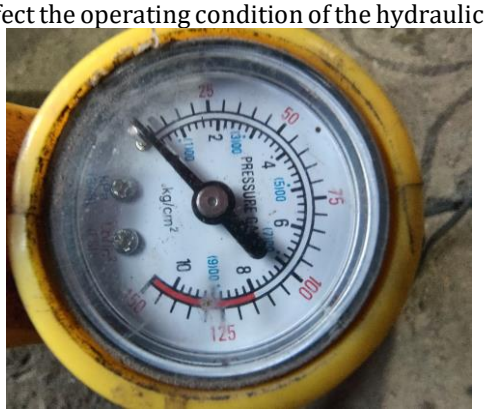
Compressed air tank is used to store the compressed air at high pressure and supply it to the turbine according to the demand. The compressed air tanks have minimum capacity of storing air for requirement of 30 min running at initial stage and maximum pressure of 200-300 psi.

### 2.2 Pneumatic Motor (Rotary Vane)

A type of pneumatic motor, known as a rotary vane motor, uses air to produce rotational motion to a shaft. The rotating element is a slotted rotor which is mounted on a drive shaft. Each slot of the rotor is fitted with a freely sliding rectangular vane.The vanes are extended to the housing walls using springs, cam action, or air pressure, depending on the motor design. Air is pumped through the motor input which pushes on the vanes creating the rotational motion of the central shaft.

### 2.3 Pressure gauges

A pressure gauge is a fluid intensity measurement device. Pressure gauges are required for the set-up and tuning of fluid power machines, and are indispensable in troubleshooting them. Without pressure gauges, fluid power systems would be both unpredictable and unreliable. Gauges help to ensure there are no leaks or pressure changes that could affect the operating condition of the hydraulic system.



### 2.4 Battery

This type of battery is cheap compare to other type of batteries and it is sealed, rechargeable lead acid battery which is 12V 7AH of capacity.

These batteries are predominately used for UPS applications both in standby use and cyclic use.


### 2.5 Compressor

A compressor is a mechanical device that increases the pressure of a gas by reducing its volume. An air compressor is a specific type of gas compressor. Compressors are similar to pumps: both increase the pressure on a fluid and both can transport the fluid through a pipe.
Air compressors have many uses, including: supplying high-pressure.

## 3. WORKING PRINCIPLE

Compressed air bicycle runs on the principle of expansion of compressed air. Here with the use of compressed air the air motor is operated.
And with the air motor the bicycle sprocket wheel is connected.
Compressed air is discharged through air tank.

## 4. CALCULATION

- Pressure Gauge: 0-100 psi (Measuring pressure)
  0-7 kg/cm$^2$
- Compressed Air Tank: 100 psi (capacity)
  Recharging capacity: 90psi in 15 minutes with 12vcompressor.

  Auto cutout power of compressor when 90psi reached.

- Air Motor:
  Maximum Torque:340 Nm
  Working Pressure: 90 psi
  Air Inlet hose diameter: ¼ inch
  No load speed: 7000 RPM
  Avg. Air Consumption: 7.5 CFM
  Weight: 2.18 kg

- Air Compressor: Pressure (150 psi)
  or 0-10kg/cm$^2$
  Power (12 v)
- Battery: 12v

## 5. CONCLUSIONS

It's important to remember that while vehicles running on only compressed air might seem like a distant dream, but they still have public interest due to their environmental friendly nature. Efforts should be to make them light, safe, cost effective and economical for deriving. Compressed air for vehicle propulsion is already being explored and now air powered vehicles are being developed as a more fuel-efficient means of transportation.

Some automobile companies are further exploring compressed air hybrids and compressed fluids to store energy for vehicles which might point the way for the development of a cost effective air powered vehicles design. Unfortunately there are still serious problems to be sorted out before air powered vehicles become a reality for common use but there is a hope that with the development in science & technology well supported by the environmental conscious attitude it will be possible.

## REFERENCES

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