Hybrid Vehicle with Micro Air Engine

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Abstract- The Air Driven Engine is an eco-friendly engine, which operates with compressed air.An Air Driven Engine uses the expansion of compressed air to drive the pistons of an engine An Air Driven Engine is a pneumatic actuator that creates useful work by expanding compressed air. There is no mixing of fuel with air as there is no combustion. An Air Driven Engine makes use of Compressed Air Technology for its operation The Compressed Air Technology is quite simple. If we compress normal air into a cylinder the air would hold some energy within it. This energy can be utilized for useful purposes. When this compressed air expands, the energy is released to do work. So this energy in compressed air can also be utilized to displace a piston

I. INTRODUCTION

At first glance the idea of running an engine on air seems to be too good to be true. Actually, if we can make use of air as an aid for running an engine it is a fantastic idea. As we all know, air is all around us, it never runs out, it is non-polluting and it is free.

An Air Driven Engine makes use of Compressed Air Technology for its operation. Compressed Air Technology is now widely preferred for research by different industries for developing different drives for different purposes. The Compressed Air Technology is quite simple. If we compress normal air into a cylinder the air would hold some energy within it. This energy can be utilized for useful purposes. When this compressed air expands, the energy is released to do work.

So this energy in compressed air can also be utilized to displace a piston. This is the basic working principle of the Air Driven Engine. It uses the expansion of compressed air to drive the pistons of the engine. So an Air Driven Engine is basically a pneumatic actuator that creates useful work by expanding compressed air. This work provided by the air is utilized to supply power to the crankshaft of the engine.

In the case of an Air Driven Engine, there is no combustion-taking place within the engine. So it is non-polluting and less dangerous. It requires lighter metal only since it does not have to withstand elevated temperatures.

As there is no combustion-taking place, there is no need for mixing fuel and air. Here compressed air is the fuel and it is directly fed into the piston cylinder arrangement. It simply expands inside the cylinder and does useful work on the piston. This work done on the piston provides sufficient power to the crankshaft.

II. LITERATURE REVIEW

2.1. COMPRESSED AIR TECHNOLOGY

Air can be compressed into small volumes and can be stored in suitable containers at high pressures. Such air compressed into containers is associated with an amount of energy. When the stored compressed air is released freely it expands thereby releasing the energy associated with it. This energy released can be utilized to provide useful work.

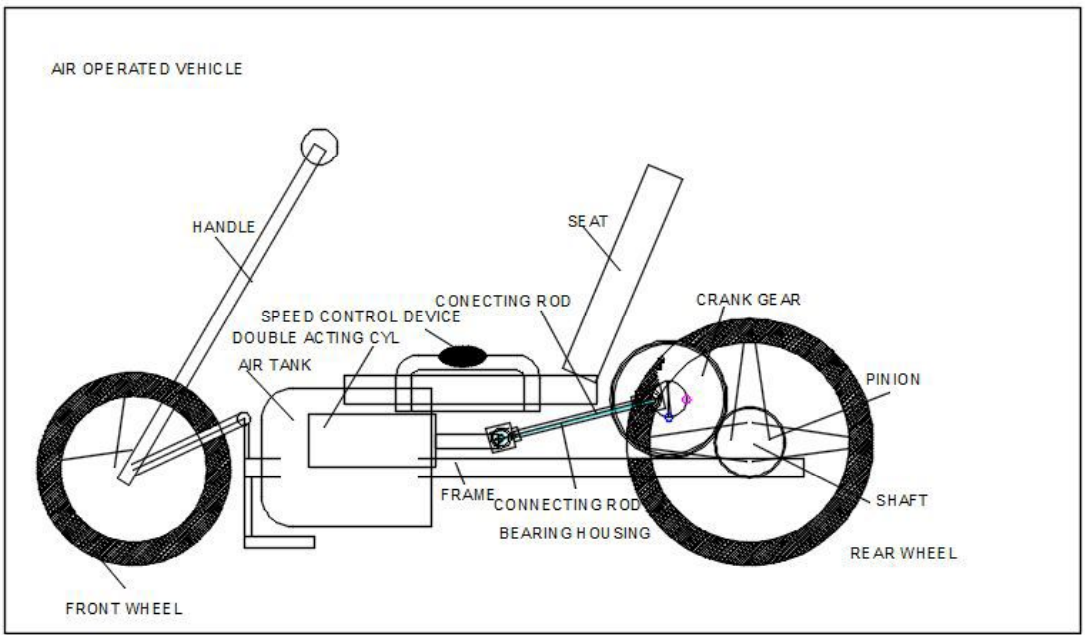
The compression, storage and release of the air together are termed as the Compressed Air Technology. This technology has been utilized in different pneumatic systems. This technology has been undergoing several years of research to improve its applications.

Compressed air is regarded as the fourth utility, after electricity, natural gas, and water. Compressed air can be used in or for:

- Pneumatics, the use of pressurized gases to do work.
- vehicular transportation using a compressed air vehicle
- scuba diving
- To inflate buoyancy devices.
- Cooling using a vortex tube.
- Gas dusters for cleaning electronic components that cannot be cleaned with water.
- air brake (rail) systems
- air brake (road vehicle) systems
- starting of diesel engines (an alternative to electric starting)
- compressed air breathers (such as Suisse Air)
- pneumatic air guns
- pneumatic screwdrivers

2.2. TWO STROKE ENGINE

A two-stroke engine is aninternal combustion enginethat completes the thermodynamic in two movements of the piston compared to twice that number for a four-stroke engine. This increased efficiency is accomplished by using the beginning of the compression stroke and the end of the combustion stroke to perform simultaneously the intake and exhaust (or scavenging) functions. In this way two-stroke engines often provide strikingly high specific power. Gasoline (spark ignition) versions are particularly useful in lightweight (portable) applications such as chainsaws and the concept is also used in diesel compression ignition engines in large and non-weight sensitive applications such as ships and locomotives.



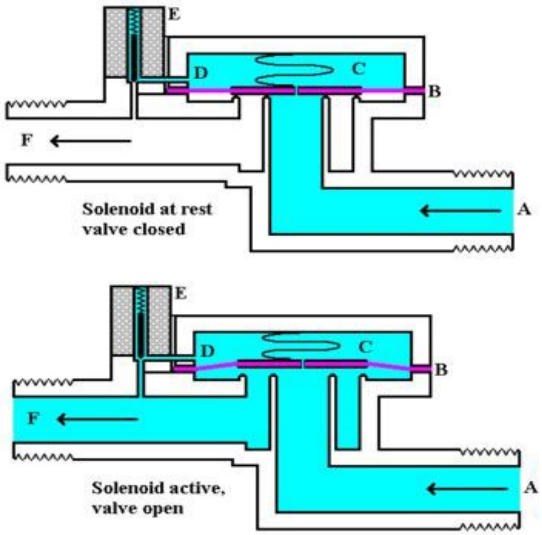
2.3. SOLENOID VALVE

A solenoid valve is an electromechanical valve for use with liquid or gas. The valve is controlled by an electric current through a solenoid coil. Solenoid valves may have two or more ports: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold.

Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

A solenoid valve has two main parts: the solenoid and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically. A direct acting valve has only a small flow circuit, shown within section E of this diagram. This diaphragm piloted valve multiplies this small flow by using it to control the flow through a much larger orifice.Solenoid valves may use metal seals or rubber seals, and

may also haveelectrical interfaces to allow for easy control. A spring may be used to hold the valve opened or closed



while the valve is not activated.

fig. 2.2 working of solenoid valve

A- Input side

B- Diaphragm

C- Pressure chamber

D- Pressure relief conduit

E- Solenoid

F- Output side

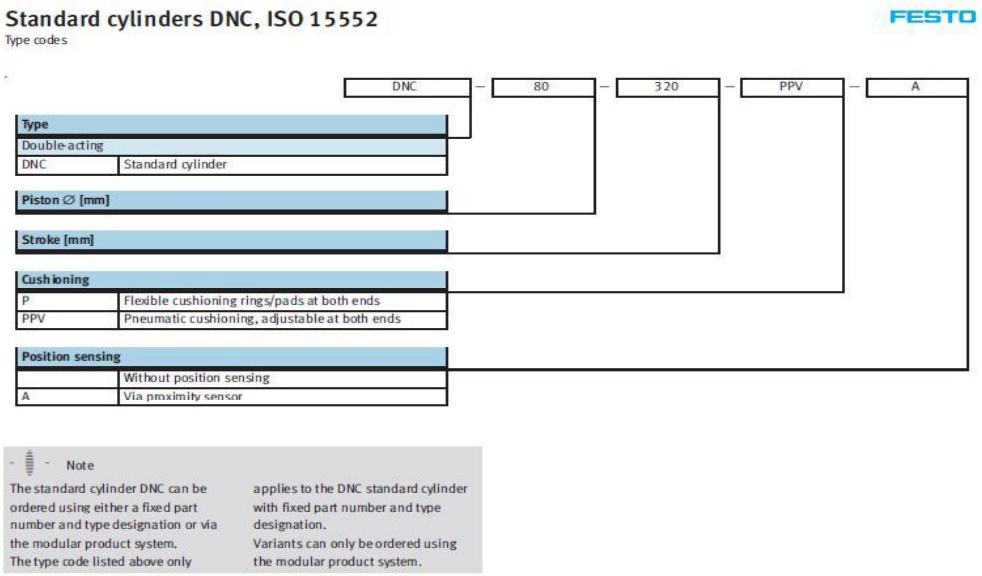
The diagram above shows the design of a basic valve.

2.4. AIR COMPRESSOR

An air compressor is a device that converts electrical power or gas into kinetic energy by pressurizing and compressing air, which is then released in quick bursts. There are numerous methods of air compression, divided into either positive-displacement or non-positive displacement types.

SELECTION OF CYLINDER

STANDARD CATALOGUE IS NOT AVAILABLE SEPERATELY FOR CYLINDER THAT WE USE, I.e. 50 mm piston dia and 40 mm stroke… the data below is standard sheet as example to ordering code and cylinder



Standard cylinders DNC, ISO 15552

Type codes

FESTO

DNC – 80 – 320 – PPV – A

Type	
Double-acting	
DNC	Standard cylinder
Piston ∅ [mm]	
Stroke [mm]	
Cushioning	
P	Flexible cushioning rings/pads at both ends
PPV	Pneumatic cushioning, adjustable at both ends
Position sensing	
	Without position sensing
A	Via proximity sensor

Note

The standard cylinder DNC can be ordered using either a fixed part number and type designation or via the modular product system. The type code listed above only applies to the DNC standard cylinder with fixed part number and type designation. Variants can only be ordered using the modular product system.

details…

CYLINDER SELECTED
DNC – 50 – 40-PPV-A

Criterion	Feature
Stroke	80 mm
Piston diameter	32 mm
Piston rod thread	M10 x 1.25
Cushioning	PPV: Pneumatic cushioning adjustable at both ends
Assembly position	Any
Conforms to standard	ISO 15552 (previously also VDMA 24652, ISO 6431, NF E49 003.1, UNI 10290)
Piston-rod end	Male thread
Design structure	Piston

	Piston rod
Position detection	For proximity sensor
Variants	Single-ended piston rod
Operating pressure	0.6 - 10 bar
Mode of operation	double-acting
Corrosion resistance classification CRC	2
Impact energy in end positions	5 J
Cushioning length	22 mm
Theoretical force at 6 bar, return stroke	754N
Theoretical force at 6 bar, advance stroke	620 N

III. CONCLUSION

Due to use of pneumatic cylinder the movement of piston is limited and repeated continuously. When piston reciprocates half due to rack and pinion arrangement it helps flywheel to make its 3 rotation complete. Due to 3 rotation of flywheel it helps wheels to take 3 rotations.Means in half stroke we get 3 time movement of wheel. Due to half movement of piston there is also use of minimum consumption, which will help us to increase efficiency. This helps to get us 3 time more the efficiency than normal cylinder. Due to this we can say Hybrid Vehicle with Micro Air Engine.

The technology exists to build a future with a significantly lower dependence on oil and a cleaner, cooler atmosphere. With sufficient political will and automaker participation, this future can arrive in time to address these significant and growing problems. Hybrids can play an important role in realizing this future, filling the gap between immediate improvements through conventional technology and the long-term promise of hydrogen fuel cells and alternative fuels.

ACTUAL PHOTO OF VEHICLE

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