Half Yearly Magazine (June to December)

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.....

RANE POYTECHNIC TECHNICAL CAMPUS

CONTENTS

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HYDEL AERO TURBINE

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Nowadays Conventional Energy Sources are being depleted. So, The World is changing its Phase to the Renewable Energy Resources. Is it Convenient? Then our immediate Focus will turn to the Solar which is Abundant and available to Produce Power (Nearly Half -A-Day).There are some other Renewable Energy Resources available with 24 X 7. All we need to do is that a Control Device (Or) measure to make them to provides a better Efficiency than Normal condition. So, here we are going to Inter-link the two Renewable Energy Resources by means of Mechanism which convert (Or) double the power output. Hence, our sources are found Water (Hydro) & Wind (Aero) Energy to Interlink in such a way that both can operate at a time. The Hydel power plant will be chosen as a fountain and the horizontal wind turbine will be interlinked with it. So, that the efficiency can be improved and availed by 24 X 7, also our Motto will be achieved. Finally, it provokes a "GO GREEN CONCEPT"

Keywords: *Hydel, Meshing (or) Inter-Link, Aero Turbines, Overshot Type, under shot Water wheel, Bevel Gear.*

INTRODUCTION

In this topic HYDEL AERO Turbines we are going to meshing up the power transmission of the two renewable energy sources by means of the power transmitting linkage between the Hydel turbine and wind turbine. By doing so, we can be able to multiple the power output of two power plants.

And this also makes the output to be consistent for a long period duration.

HYDEL POWER PLANT

Waterwheels are machines that convert the energy of flowing or falling water into power that can be used to do other tasks. If you've ever seen waterwheels, you know that they are usually large wheels made of wood or metal that have many blades or buckets along the outside edge to capture the power of moving water.

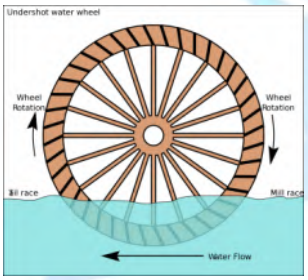
PRINCIPLE:

In hydro power plant we use gravitational force of fluid water to run the turbine which is coupled with electric generator to produce electricity.

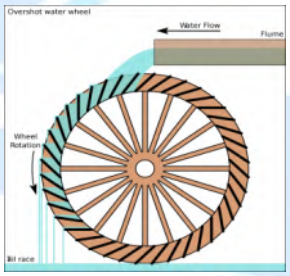
TYPES OF WATERWHEEL:

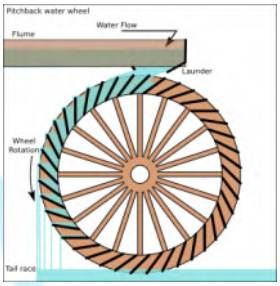
There are three types of waterwheel

****UNDERSHOT WATER WHEEL***



****OVERSHOT WATER WHEEL***





***PITCHBACK WATER WHEEL**

In these three types, we are using overshot water wheel.

CONSTRUCTION:

The waterwheel is made up of 2 disks (the sides), and 12 paddles. Using 12 paddles makes it easy to mark out the location of each paddle on the wheel since they are separated by a 30 degree angle (= 360 degrees / 12). The paddles were chamfered to minimise the surface area of water hit by the wheel as it rotates, with the aim of making the waterwheel as quiet as possible in operation.

WORKING OF WATERWHEEL TURBINES:

Mostly, the fast moving water (kinetic energy) strikes the turbines and they start moving (mechanical energy) and then this energy is used to run electric generators. The transference of energy takes place from one form to another. Now instead of water wheels water falling from a vertical height is used which has stored potential energy in it due to its position and the water is then passed through the gate r vessels which take the water to the turbines which convert potential energy into mechanical energy, these vessels are called penstocks.

EFFICIENCY

Overshot (and particularly backshot) wheels are the most efficient type; a backshot steel wheel can be more efficient (about 60%) than all but the most advanced and well-constructed turbines. In some situations an overshot wheel is preferable to a turbine.

The development of the hydraulic turbine wheels with their improved efficiency (>67%) opened up an alternative path for the installation of water wheels in existing mills, or redevelopment of abandoned mills.

WIND TURBINES

1. *Wind (moving air that contains kinetic energy) blows toward the turbine's rotor blades.*
2. *The rotors spin around slowly, capturing some of the kinetic energy from the wind,*

and turning the central drive shaft that supports them.

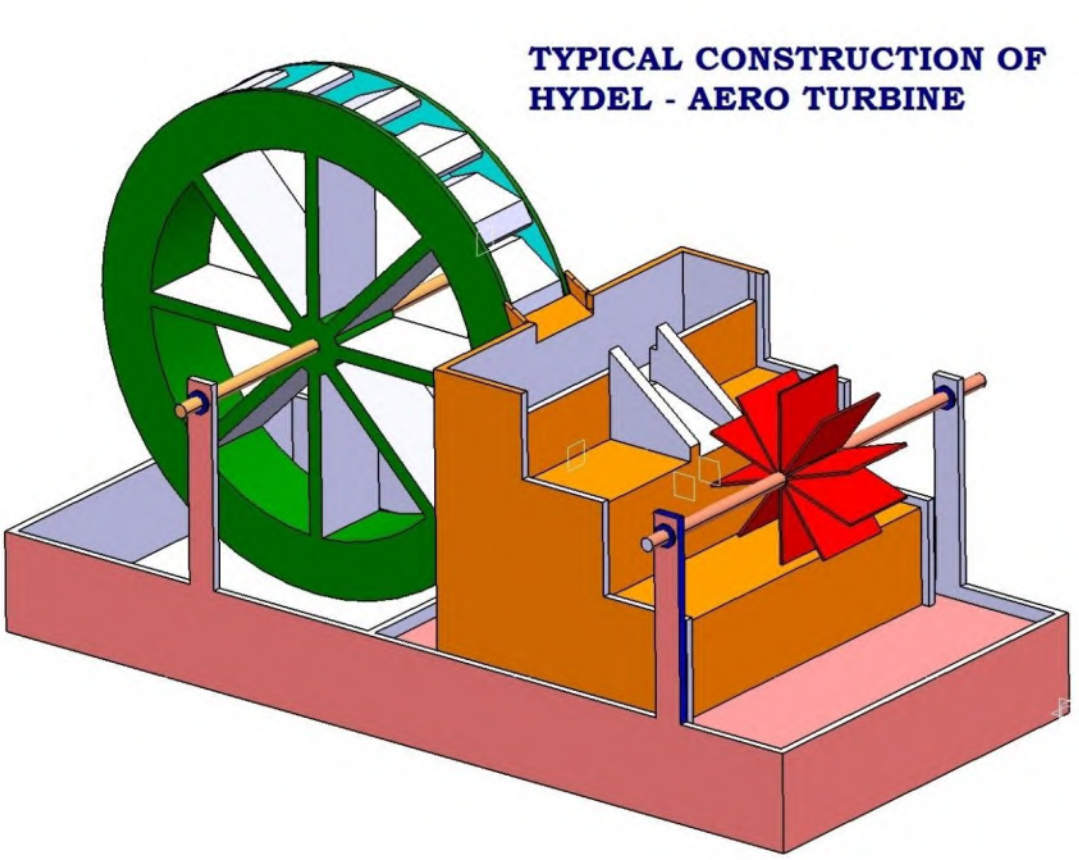
3. *The rotor blades can swivel on the hub at the front so they meet the wind at the best angle for harvesting energy.*
4. *Inside the nacelle (the main body of the turbine sitting on top of the tower and behind the blades), the gearbox converts the low-speed rotation of the drive shaft (about 16 revolutions per minute, rpm) into high-speed (1600 rpm) rotation fast enough to drive the generator efficiently.*
5. *The generator, immediately below the gearbox, takes kinetic energy from the spinning drive shaft and turns it into electrical energy. A typical turbine generator will produce 1–2 megawatts (MW) of power at about 700 volts.*
6. *Anemometers (wind-speed monitors) and wind vanes on the back of the nacelle provide measurements about the wind speed and direction.*
7. *Using these measurements, the entire top part of the turbine (the rotors and nacelle) can be rotated by a yaw motor, mounted between the nacelle and the tower, so it faces directly into the oncoming wind and captures the maximum amount of energy. If the wind speed rises too much, brakes are applied to stop the rotors from turning (for safety reasons). The brakes can also be applied for routine maintenance.*
8. *The electric current produced by the generator flows through a cable running down through the inside of the turbine tower.*
9. *A step-up transformer converts the electricity to about 50 times higher voltage so it can be transmitted efficiently to the power grid (or to nearby buildings or communities). If the electricity is flowing to the grid, it's converted to an even higher voltage (130,000 volts or more) by a substation nearby, which services many turbines.*
10. *Homes enjoy clean, green energy.*
11. *Wind carries on blowing past the turbine, but with lower speed and lower energy (for reasons explained below) and more turbulence (since the turbine has disrupted its flow).*

VERTICAL WIND TURBINE

MESHING OF HYDEL AND AERO TURBINES

We are providing here a bevel gear setup for meshing up both the Hydel and Wind Turbine. By using the bevel gears, we are able to transmit the power equally to both the wind turbine and Hydel turbine at a time. So that, the power can be produced in both the turbines. In this we are connecting the bevel gears in the end of the shaft in Hydel Turbine (horizontal position) and in the middle or certain height from the bottom in the Wind Turbine (Vertical position).

TYPICAL CONSTRUCTION



The software design was made in CATIA V5 for the understanding the construction of the complete setup. The Dimensions used in this design are given to construct the pro model. The real time values will be depends upon the area to be constructed.

OUR POINTS

1. *By Combining, both the turbines we multiple the power generation in each one of it.*
2. *Then also we have tried to compensate the seasonable power producing backlogs of RENEWABLE ENERGY RESOURCES.*
3. *We have reduced the external or Additional devices to avoid the critical handling or maintenance. So that the cost of investment can be reduced or economical.*
4. *And the maintenance is also is easier to do.*
5. *Apart from the electro-mechanical concept, we also enrich the nature and aesthetic of the particular place by means of the fountain setup.*
6. *Finally, we want to improve the "GO GREEN" concept by recycling the waste waters and the Rain Water in the specific location (where it is implemented).*

CONCLUSION

As part of improving the Power production by means of Renewable Energy Resources and recycling the wastes, the power production can be done for some prolonged duration. And reducing the Emissions of various pollutants instead of Polluting, then to achieve Green and Clean World.

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SELECTING APPROPRIATE ROOFTOP SOLAR PANELS

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India is blessed with abundant sunshine for most of the year. Switching to solar energy is therefore an extremely logical option. Solar energy is more economical and environment-friendly as compared to non-renewable sources of energy like coal and petroleum. Selecting the right product is critical for the smooth running of daily operations.

***Key words**:*

Solar panels(Photo voltaic Cell), Crystalline-Silicon Panels, Thin-Film Panels, Wattage.

WHAT SOLAR PANELS ARE?

Solar panels (also called photovoltaic) are primarily rectangular silicon devices that can convert light into electricity. These comprise several solar cells, which are spread over a large area that can work together to offer sufficient power for it to be deemed useful. Efficacy of solar panels depends on how well these face the sun.

Solar cells are available in all sizes, colours and power ratings. Applications that require minimal amount of power (20W to 40W) include solar lamps, lanterns, torches and so on. Rooftop installations require panels with heavier output of 150W to 300W or even more.

TYPES:

CRYSTALLINE-SILICON PANELS. *These include monocrystalline and multi-crystalline panels. The former produce higher amount of power and are costlier than the latter.*

THIN-FILM PANELS.*These are used in building integrated photovoltaic applications, where these become a part of the building structure.*

FACTORS THAT DETERMINE PRICE

Price of a solar panel can vary from 30/kW to 60/kW. An imported module can cost about 40/kW to 45/kW. Good ones manufactured in India can cost 30/kW to 32/kW (for bulk transactions). Retail price of a module producing 3W – 40W may vary between 60/kW and 90/kW and modules producing 50W – 300W between 55/kW and 60/kW.

Price of solar panels varies according to type, wattage, brand and testing standards, as

explained below.

Type. *Thin-film panels cost less than crystalline silicon panels.*

Wattage: *Panels that have a higher power output have a higher price as these produce more electricity.*

Testing standards: *Panels that conform to government approvals and testing standards meet a minimum amount of performance and safety conditions; hence, are costlier.*

KEY POINTERS FOR SELECTING THE RIGHT SOLAR PANEL

*HEAT TOLERANCE AND TEMPERATURE CO-EFFICIENT OF SOLAR PANELS***.** *This means that if a panel is rated as 100W, it should generate 100W under standard test conditions. In case the maker says that the panels have a tolerance of ±5 per cent, it implies that the same panel can give either 105W or even 95W. Hence, you must ensure that your solar panel has a positive tolerance mentioned on the datasheet.*

TEMPERATURE. Generally, panels are rated as per standard test conditions, that is, 25°C. If temperature is higher than this, panels may give less than the rated output.

LOCATION AND CONDITION OF THE PANEL. Ensure that the panel is facing sunlight as even a single partially-shaded panel adversely impacts the output of all solar panels in the system. Keep the panels free of dust to avoid shading. The panels should be kept at an angle. It will help in harvesting optimum energy from the sun.

VOLTAGE: Most solar panels are designed to provide 16V, which can be used to charge a 12V battery.

ROBUST DESIGN: It must be made of tough material to withstand extreme Climatic conditions.

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CATALYTIC CONVERTER-SOLUTION TO VEHICLE POLLUTION

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Keywords: *Catalytic converter, Carbon monoxide.*

Petrol (Gasoline) and Diesel for use in road transport have most of the sulphur removed when they are refined. The high temperature inside the cylinder causes the nitrogen and oxygen in the air to react forming Nitrogen dioxide.

$N_2 + 2O_2 \rightarrow 2NO_2$

Because of the Lack of oxygen in the enclosed space of an engine, the fuel does not burn completely and the carbon monoxide is formed. Another Pollution problem arising from Motor vehicle is caused by Tetra Ethyl Lead in Petrol (leaded Petrol).

Nitrogen Dioxide causes Acid Rain and combines with other gases in hot weather to cause photochemical smog. This contains low-level Ozone and cause breathing Problems. Carbon Monoxide combines with haemoglobin in blood and stops it from carrying oxygen. Carbon Monoxide causes dizziness and headaches.

Lead is a neurotoxic metal cause learning Difficulties in children.

Solution to these problems, Catalytic converters can be attached to the exhaust systems of cars.

In many countries, these converters are a legal requirement. The catalytic converts the toxic carbon monoxide, Nitrogen monoxide and unburnt Hydro carbons from the fuel into less harmful products such as carbon dioxide, Nitrogen and water.

Carbon monoxide + Oxygen → Carbon dioxide

Nitrogen monoxide + Carbon monoxide → Nitrogen + Carbon dioxide

Hydrocarbons + Oxygen → Carbon dioxide + Water

Catalytic converter speeds up the oxidation reaction considerably by oxidation reaction considerably by providing a "Honeycombed" surface which the gases can react. The converter contains a thin coating of Rhodium and Platinum catalysts on a solid honeycomb surface. These provide a large surface area for the reactions.

Catalytic converters can only be used with Unleaded Petrol. The presence of Lead would poison the catalyst and stop it working other impurities do get deposited on the catalyst surface. So, the converter eventually needs replacing after a number of years.

In 2011, the United Nations announced the successful, worldwide phasing out of leaded petrol for road vehicles. In India the utility of car increased significantly. We can minimize the air pollution marginally by fixing catalytic converter & using unleaded petrol in our vehicles.

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SIX-STROKE ENGINE

R.HARIHARAN

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*The **six-stroke engine** adds two more **strokes** after the exhaust **stroke**. Water is injected, and as it turns into steam, it pushes the piston down. Then the piston comes back up to force out the steam. It's really simple.*

- *Malcolm beare built an innovative hybrid design of the I C engine , by combining a two stroke with a four stroke engine.*
- *The Beare Head is a new type of four stroke engine head design known as the "Beare Head"*
- *The Beare Head uses a piston and ports very much like a two stroke engine to replace the over head valve system that is found in four stroke engines today. The four stroke block, pistons and crankshaft remain unaltered. This combination of two stroke and four stroke technology has given the engine its name – the "six stroke engine" (2 + 4 = 6).*

Key words: *six stroke, Beare Engine, Opposed Piston, Bajulaz six-stroke engine and Griffin six-stroke engine.*

INTRODUCTION

*The term **six-stroke engine** has been applied to a number of alternative internal combustion engine designs that attempt to improve on traditional two-stroke and four-stroke engines. Claimed advantages may include increased fuel-efficiency, reduced mechanical complexity and/or reduced emissions. These engines can be divided into two groups based on the number of pistons that contribute to the six strokes.*

In the single-piston designs, the engine captures the heat lost from the four-stroke Otto cycle or Diesel cycle and uses it to drive an additional power and exhaust stroke of the piston in the same cylinder in an attempt to improve fuel-efficiency and/or assist with engine cooling. The pistons in this type of six-stroke engine go up and down three times for each injection of fuel. These designs use either steam or air as the working fluid for

the additional power stroke.

ENGINE TYPES

Single-Piston designs	***Opposed-Piston designs***
Griffin six-stroke engine	*Beare head*
Dyer six-stroke engine	*M4+2*
Bajulaz six-stroke engine	*Other two-piston designs*
Velozeta six-stroke engine	*Piston-charger engine*
NIYKADO six-stroke engine	*Ilmor/ Schmitz Five-Stroke*
Crower six-stroke engine	

WORKING PRINCIPLE

Fuel ignites with piston at the top dead center.

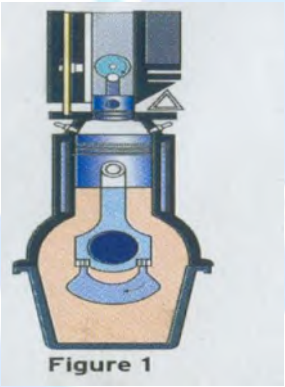


Figure 1

Rotary valve opens, allowing exhaust to escape

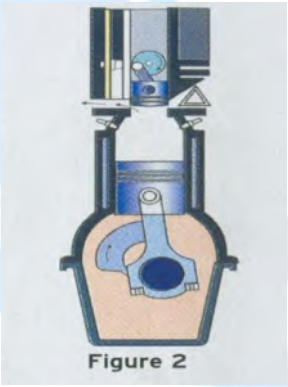


Figure 2

Exhaust stroke begins when the piston is at bottom dead center

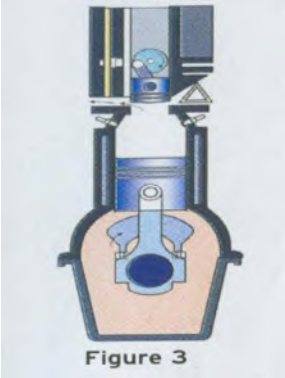


Figure 3

Exhaust stroke ends, intake begins. Rotary valve cuts exhaust .intake of charge into cylinder due to pressure difference.

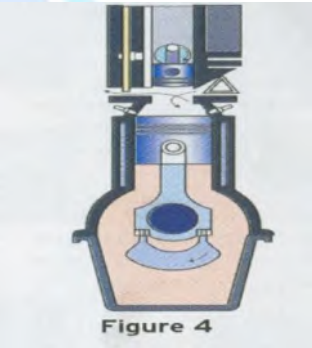


Figure 4

The intake stroke happens when the piston is on its downward path with the intake valve open. This action creates suction, drawing atomized fuel in this case gasoline mixed with air, into the combustion chamber.

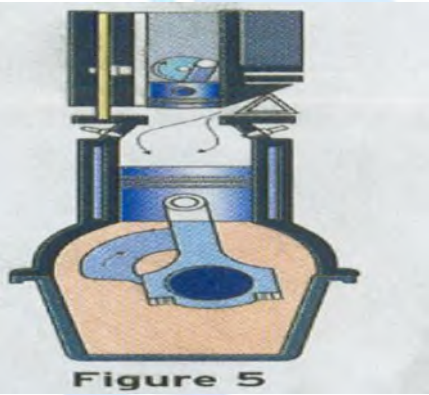


Figure 5

Ready for the combustion the combustion chamber completely sealed.

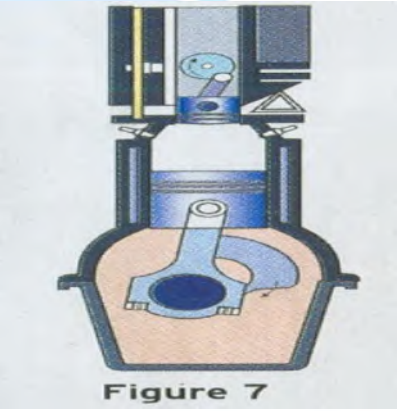


Figure 7

The power stroke begins at a critical moment, just as the air-fuel mixture is at its most compressed. A supercharged voltage is delivered to the spark plugs from the ignition coil, at that point it ignites the fuel mixture. The valves in the engine are still closed during this period. Thus the explosion forces the piston down to turn the engine's crankshaft, delivering the power via the gearbox and clutch to the driving wheels.

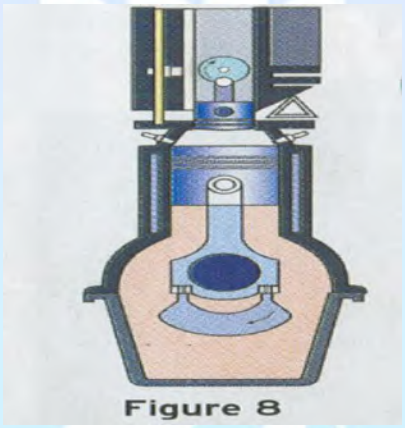
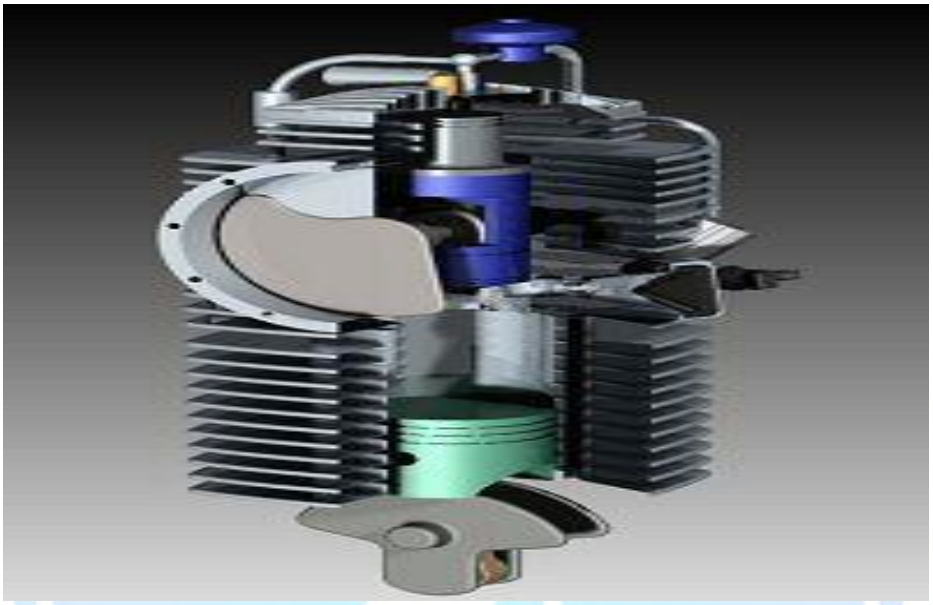
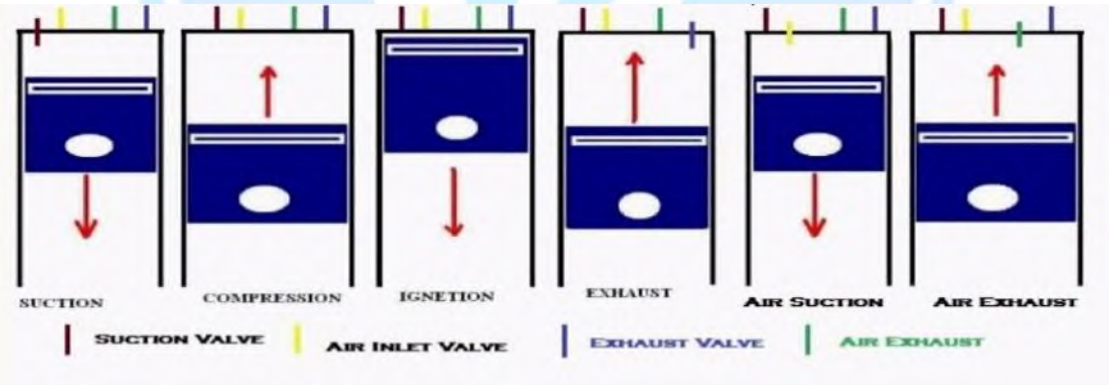


Figure 8

OPERATION

A six-stroke engine combines an internal combustion engine with a steam engine to turn some of the waste heat into power. The only catch is that you have to add a water tank to your car that's about the same size as the gas tank. The good news is that you can probably eliminate the radiator. (As per HSW)




SUCTION
COMPRESSION
IGNETION
EXHAUST
AIR SUCTION
AIR EXHAUST
SUCTION VALVE
AIR INLET VALVE
EXHAUST VALVE
AIR EXHAUST

CONCLUSION

In a six stroke engine the energy absorption is less because of slower acceleration of reciprocating parts The piston speed of the upper piston is about a quarter of the main piston; therefore its service life should be at least twice that of the main piston.

In the Beare design, per single cylinder, the number of parts is 15 compared to a four stroke of approx. 40 to 50 parts. Also, to reduce manufacturing costs the head and block can be machined in one piece.

The bottom piston is a standard design and the Beare Head bolts directly onto the engine block, replacing the overhead valves and standard head.

It reduces the weight and complexity of the engines head by as much as 50%. Instead of using energy to drive the head, the head actually develops energy for conversion to power back through the timing chains of an engine.

Torque is increased by 35% and efficiency increased by the same. This can be achieved by simply unbolting an existing head of a four-stroke engine and then bolting on a Beare Head.

Increased torque and power output,

Better fuel economy and cleaner burning longer service intervals and considerably reduced tooling costs when compared with a conventional four-stroke design.

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