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AERO-GASOLINE ENGINE

(-An ingenious multifuel engine)

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***Abstract*— As the world is hard pressed with the energy and fuel crises, compounded by pollution of all kinds, any technology that brings out the solution to this problem is considered as a bounty. In one of such new technologies, is the development of a new engine called as "Aero-Gasoline Engine", which can use either of the fuel, air or Gasoline. This reduces consumption of fossil fuels which inturn solves the pollution problem.The cost of fuel is also drastically decreases as well the maintenance cost of the engine comes down.**

INTRODUCTION

Fossil fuels, 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 our environment, and eventually, for the total life on our planet. One possible alternative is the aero-Gasoline Engine, which runs on both fuels like Compressed air and gasoline. Air, which is abundantly available and is free from pollution, can be compressed to higher pressures at a very low cost, is one of the prime option since Atmospheric pollution can be reduced to some extent. Whereas gasoline is the common fuel which is already using in conventional type of Engines. Compressed air was also used in some of the vehicle for boosting the initial torque. Turbo charging has become one of the popular techniques to enhance power and improve the efficiencies of the automotive engines. So one of the attempts has been made but to modify the existing engine and to test on both compressed air and gasoline

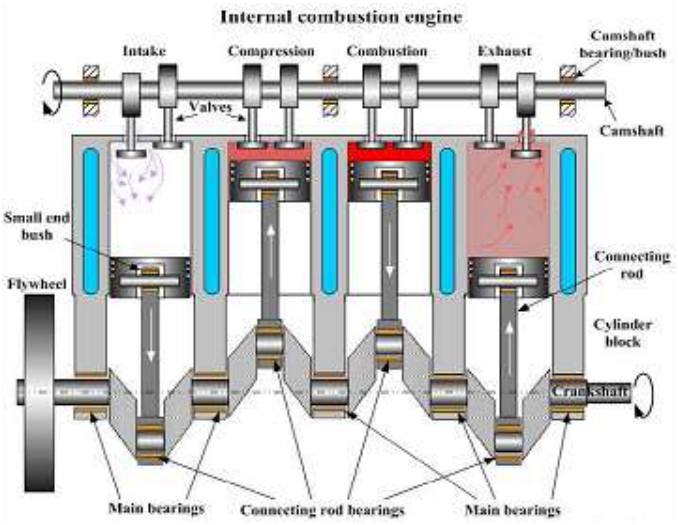
OPERATION OF 4-STROKE ENGINE

Suction stroke: Fuel and air mixture introduced into the intake manifold. Inlet valve remains open and Exhaust valve closed as per Valve timing diagram. The piston moves from T.D.C to B.D.C.

Compression: The charge is compressed in the compressed stroke by moving the piston B.D.C to T.D.C. In this stroke both valves are in closed position

Expansion/Power stroke: The charge is combusted in the combustion chamber which gives power to the engine by means of operating the piston again from T.D.C to B.D.C. In this stroke both valves are in closed position

Exhaust stroke:The exhaust stroke occurs when spent gases are expelled from the combustion chamber and released to the atmosphere. The exhaust stroke is the final stroke and occurs when the exhaust valve is open and the intake valve is closed



GENERAL 4-STROKE ENGINE

OPERATION OF COMPRESSED AIR ENGINE:

The working of compressed air engine partially similar with general 4-stroke engine.

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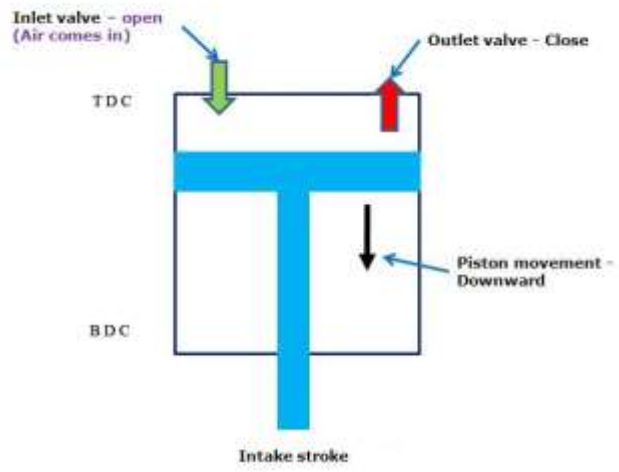
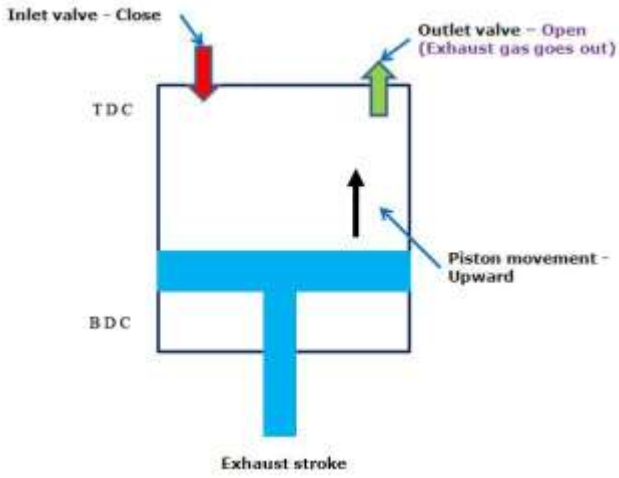
Basically it has two strokes. They are
1. Suction as power stroke.
2. Exhaust stroke.
Basic 4-stroke engine is modified into 2 stroke engine.





- ***OPERATION OF ENGINE ACCORDING TO ELECTRONIC CONTROL UNIT PROGRAM:***

- Generally advanced gasoline engines works on Multi Point Fuel Injection or Gasoline Direct Injection by operating Cam using Variable Valve timing Technology. Less capacity engines use timing chain to operate valves. Coupling of timing chain between Crankshaft and Camshaft gives N/2 rotations to the CAMSHAFT i.e., if the crankshaft speed is N rotations then the speed of cam shaft is half of the speed of CRANKSHAFT which operates the Engine in four strokes

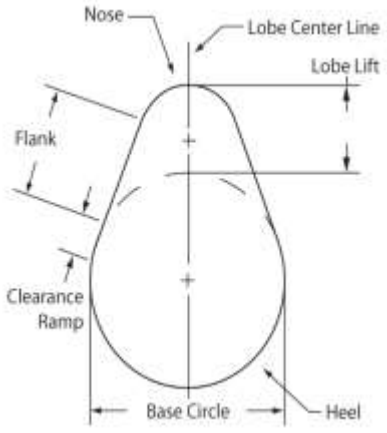
- Now Variable Valve Timing technology was already introduced and it is predominantly used in all gasoline operated Engines. It is often used to improve performance, fuel economy and reduced emissions.

- Variable Valve Timing working on ECU program.

CAM operation according to variable valve timing

OPERATION OF COMPRESSED AIR ENGINE USING VARIABLE VALVE TIMING TECHNOLOGY:

We already know that the conventional gasoline engine consists of four strokes. But compressed Air Engine requires only two strokes. For attaining both Technologies in same Engine without any modification we should go for Variable Valve Timing technology to operate the engine on Compressed Air as well as Gasoline.



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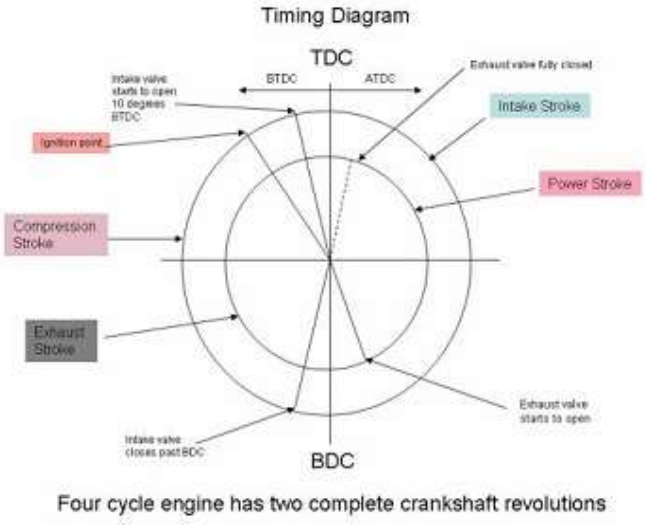
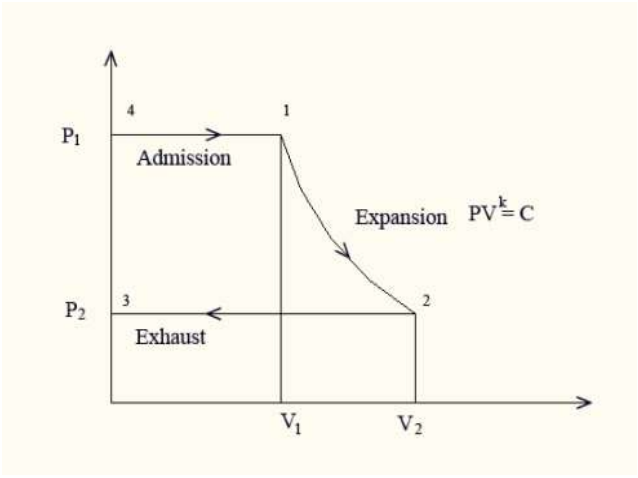
GENERAL 4-STROKE ENGINE

VALVE TIMING DIAGRAM



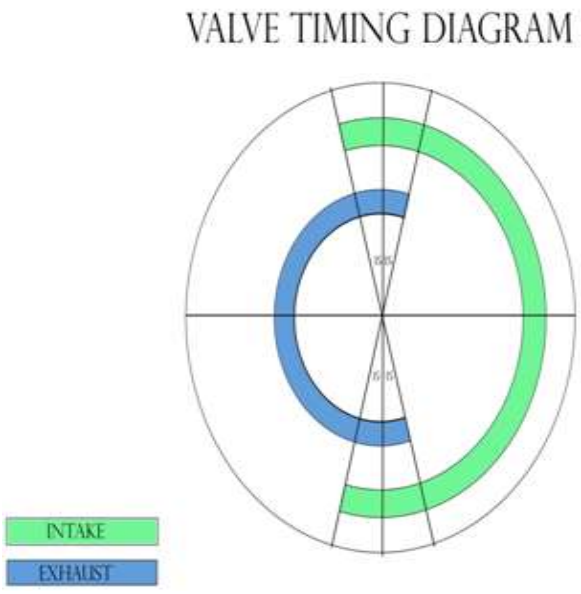
Cycle of Air Engine

P-V

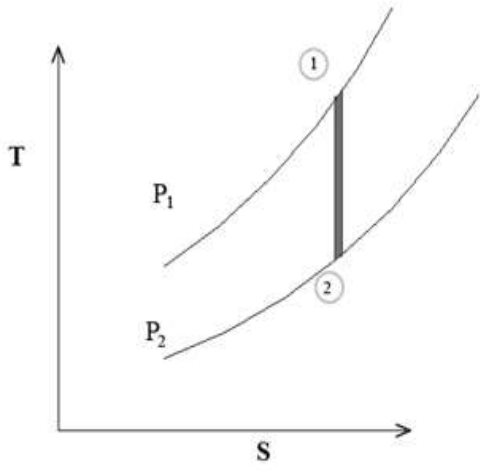


P_{in} Vs n

COMPRESSED AIR ENGINE



T-S



P_{inlet} Vs $P_{delivary}$

Compressed Air Engine PV and TS (Assuming Frictionless Adiabatic process)

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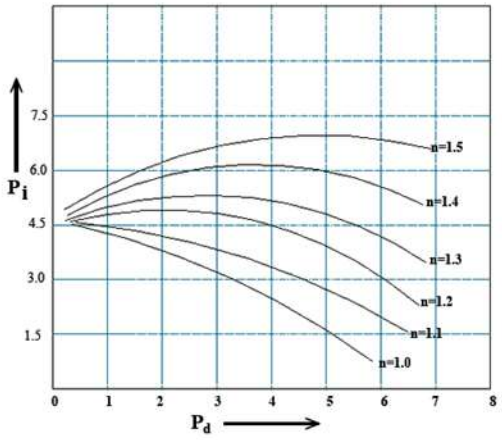
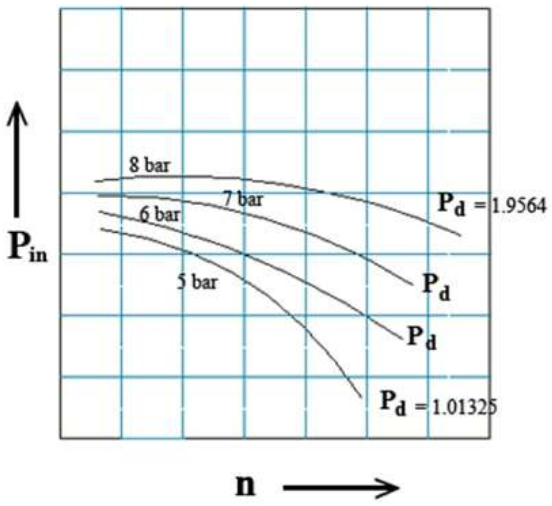
INLET VS DELIVERY PRESSURE OF COMPRESSED AIR ENGINE



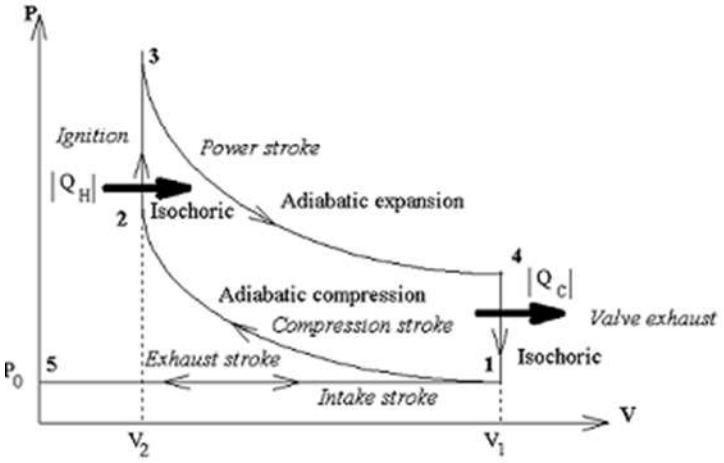


GENERAL 4-STROKE ENGINE BAJAJ CALIBER 115:

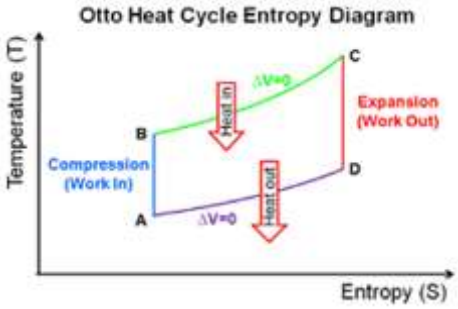
Displacement	Compression ratio	Cam type	power	Torque
111.6	9.9:1	SOHC	7.1KW	9.12Nm@6500

Cycle of Genaeral Petrol Engine

PV DIAGRAM



TS DIAGRAM



COMPRESSED AIR ENGINE USING CALIBER115 BY MODIFYING CAM

Pressure In bar	Load In KG	Speed In rpm	Mean effective pressure In bar	Work Done In Newton meter	Indicative power In KW	Friction power Fp in KW	Break power In KW	Mechanical efficiency η_{mech} in %	Volumetric efficiency η_{vol}
5	0	850	2.049	22.869	0.3239	0.065	0.263	80	76.3
5	5	580	2.049	22.869	0.2210	0.044	0.176	80	76.3
5	10	305	2.049	22.869	0.1162	0.09	0.23	80	76.3
8	0	1200	2.84	31.740	0.634	0.126	0.50	80	95.4
8	10	770	2.84	31.740	0.406	0.06	0.324	80	95.4

Assuming F_p = 20%

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Conclusion:

We hope Compressed air storage tanks built with carbon fibers will carry high amount of pressure with minimum volume of space and general 4-stroke petrol engines works on gasoline which obviously meets the requirement with conventional engines with reduced emissions. Aero gasoline Engines is a Realization of most advanced coming technology in automobile field. It reduces the use of fossil fuel consumption there by reducing environmental pollution.

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