A REVIEW ON BASICS OF SIX STROKE ENGINE

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ABSTRACT

In Six Stroke Engine the power obtained is twice in a cycle of six strokes. This type of engine generates more power with higher fuel efficiency. Consequently, a new engine theory is formed, which is a six stroke IC engine. A Lot of research work has been conducted on this topic. In a typical four stroke engine, Piston moves up and down two times in the cylinder for one rotation of crank. The power is obtained one time among the two cycles that generates the torque. In Six stroke engine the power stroke is obtained two times out of six strokes. The automobile industry is now looking forward to manufacture the six stroke engine with the best design which adds one more power stroke which results in more efficiency and better consumption of the fuel. The main advantages of six stroke engines are two power strokes in the six stroke cycle, diminution in fuel consumption by at least 40%, remarkable reduction in pollution, adaptability of Multi fuel, reduction in chemical, noise and thermal pollution. Development of Six stroke engines by the automobile industry would have a tremendous impact on the environment and economy.

Keywords: *Six Stroke Engine, Crankshaft, cylinder, Combustion Chamber.*

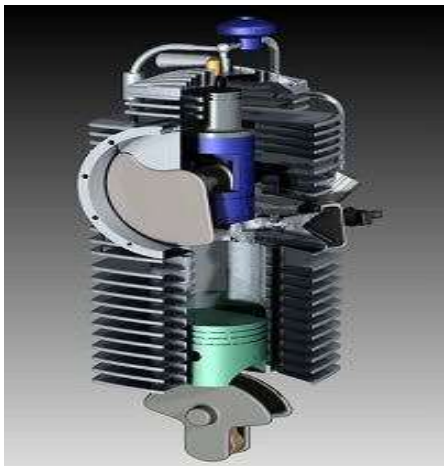
1.0 INTRODUCTION

The majority of the automobiles and several energy production sources use IC Engines. As the IC Engines run on fossil fuels, it is extremely important to take measures to increase the efficiency. More or less after 100 years it is predicted that there will be shortage in the petroleum products and the world may face severe crisis due to dramatic increase in the number of vehicles. On the other hand, the exhaust gases of the IC Engine includes CO, CO2, NOX and the other harmful gases which could worsen the situation in coming few decades. An effective design of six stroke IC engine could increase the efficiency which in turn will reduce the pollution.

In 4 stroke engines enormous quantity of heat is produced. Around 35-40% of existing energy is transformed into useful energy with the intention of achieving the rotation of crankshaft where as the left over energy is either expelled to the surrounding or simply increases the temperature of the engine. The six stroke IC engine is the latest development in which the two additional strokes are performed which consequently develops more power by utilizing the exhaust gases

Six stroke IC engine

The mechanical design of the six stroke engine is almost same as that of conventional four stroke engine but has slight modifications with addition of two extra valves on cylinder head. Also, the operation is similar to that of traditional internal combustion engine in which the linear motion of connecting rod is converted to the rotational motion of the crankshaft. In addition to the four strokes the fifth stroke is the second power stroke which utilizes the heat evolved in the exhaust gases to push down the piston to produce power for second time and the 6^{th} stroke is exhaust stroke. In this type of engine the cooling system can be eliminated as the heat produced by 4^{th} stroke is utilized by fifth stroke.



Six stroke engine model

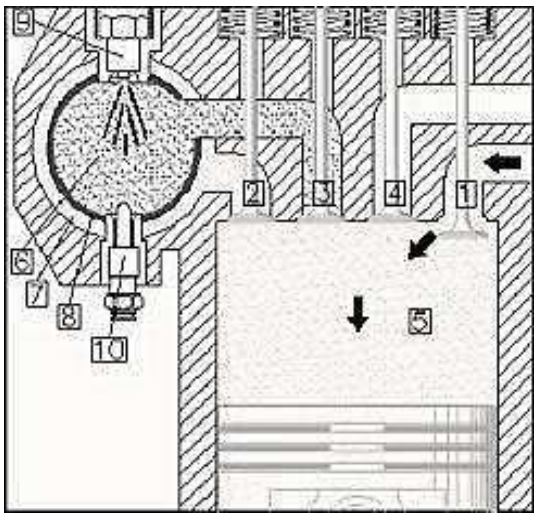
2. ANALYSIS OF SIX STROKE ENGINE

In six stroke engine analysis two functions occur simultaneously in internal and external combustion chambers resulting in eight event cycle. Moreover, there is a direct contact between the air and working fluid in internal combustion chamber where as there is no direct contact between air and working fluid in the external combustion chamber.

The events that affect the motion of the crankshaft are called dynamic events and events which do not effect are called static events.

Major components of stroke engine

1. Intake Valve
2. Heating Chamber Valve
3. Combustion Chamber Valve
4. Exhaust Valve
5. Cylinder
6. Combustion Chamber
7. Air Heating Chamber
8. Wall of Combustion Chamber
9. Fuel Injector
10. Spark Ignition System



Analysis of engine results in eight event cycle in external and internal combustion cycle as follows:

External Combustion cycle:

Event1: pure air intake in the cylinder (dynamic event)

Event2: pure air combustion in the heating chamber (dynamic event)

Event3: Keeping pure air pressures in closed chamber where as a maximum heat exchange occurs with combustion chamber walls, without direct action on crankshaft (static event)

Event4: Expansion of the super heated air in the cylinder work (dynamic event)

Internal combustion cycle:

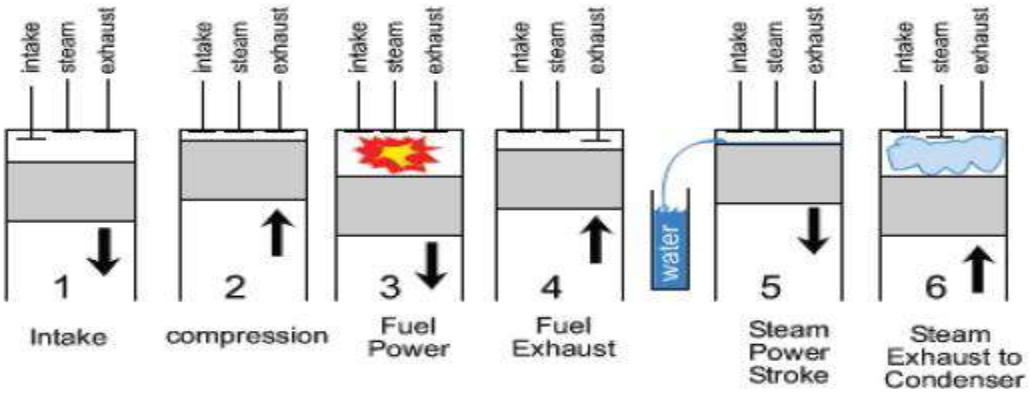
Event5: Re-compression of pure heated air in the combustion chamber (dynamic event)

Event6: Fuel injection and combustion in closed combustion chamber, without direct action on the crankshaft (static event)

Event7: Combustion gases expanding in the cylinder, work (dynamic event).

Event8: Combustion gases exhaust (dynamic event).

The six strokes performed during the cycle of operation are as follows:



First stroke (Suction stroke):

During the first stroke as the inlet valve opens the piston from TDC moves to BDC resulting in the suction of pure air into the cylinder. When piston reaches BDC the inlet valve gets closed.

Second stroke (Compression stroke):

During the second stroke both inlet and exhaust valves remains closed. As the piston moves from BDC to TDC the air-fuel mixture gets compressed.

Third stroke (First power stroke):

During this stroke both the valves remained closed and the air-fuel mixture is ignited using the spark plug. The expanding force of the burning fuel pushes the piston from TDC to BDC which provides the power to the crankshaft.

Fourth stroke (Re- compression stroke):

During the third stroke, piston moves from BDC to TDC with both the inlet and the exhaust valves remained closed. By the time piston reaches TDC during the fourth stroke, water injector injects water which is then converted to steam.

Fifth stroke (Second power stroke):

During this stroke the converted steam pushes down the piston from TDC to BDC with both the valves kept closed. As a result the power expanding force of the steam provides the power to the crankshaft.

Sixth stroke (Exhaust stroke):

During this stroke the inlet valve is closed and the exhaust valve gets opened. As the piston moves from BDC to TDC the gases are released from exhaust valves.

3. CONCLUSION

In today's world there might be no surprise solution to substitute the IC engines. Regeneration might be the only feasible choice. The six stroke IC engine could be the optimal solution. If the automobile industry adopts this technology there will be an incredible impact on atmosphere and it would be a cost-cutting measure in this developing world. It is predicted that there will be 35-40% reduction in fuel consumption and 60-80% in polluting emissions, depending on the type of fuel being used. Taking into account the advantages of the Six Stroke IC engine, this type of engine would be the most excellent solution in the next decades.

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