

Concept of Six Stroke Engine

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Abstract: The aim of the presented paper is to understand the latest trends in Internal Combustion Engine while maintaining its prime focus on six stroke engine. One of the most difficult challenges in engine technology today is the urgent need to increase engine thermal efficiency. The automotive industry may soon be revolutionized by a new six- stroke design which adds a second power stroke, resulting in much more efficiency with less amount of pollution. In six stroke the engine captures the exhausted heat from the four stroke cycle and uses it to get an additional power and exhaust stroke of the piston in the same cylinder. This heat is used to generate the steam from the water which is further used as a working fluid for the additional power stroke.

1-Introduction

The six stroke engine is a type of IC engine based on the four Stroke engine but with additional complexity intended to make it more efficient and reduce emissions. Six stroke engine captures the wasted heat from the four stroke Otto Cycle , Creates steam and cools engine by providing free Power

Stroke developed by BRUCE CROWER and MALCOLM BEARE

The six stroke engine is a concept that has been around for over 100 years , but has only recently been re-considered as a feasible alternative to the conventional Four Stroke Engine due to advancement in automotive and material technologies

Amidst the ever progressing automobile engineering comes a new trend of engines popularly known as the 6 stroke engines.

The six stroke engines are mostly recommended for their extra power output and thus most preferred in heavy vehicles where the prime focus is on load carrying capacity rather than fuel economy. It consists of six strokes which are due to the radical hybridization of 2 strokes and 4 strokes, i.e. the piston in each move goes up and down six times for the injection of fuel. The six stroke engine consists of 2 chambers having internal combustion and external combustion wherein, the unused or waste heat from the 4 stroke Otto cycle is then used to carry out further strokes. These 2 additional strokes increase the work extracted per unit input of energy, which then lead to 40% increase in fuel efficiency than the four stroke Otto cycle.

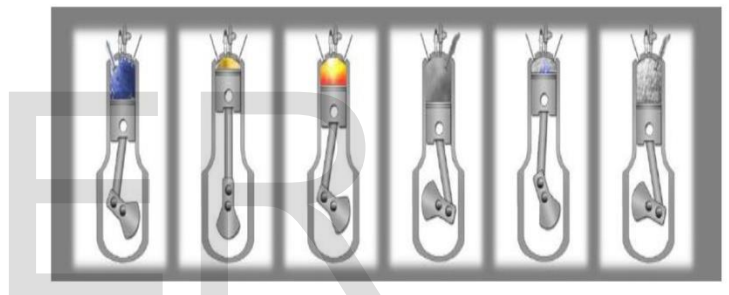
According to the literature survey done, the Niykado six stroke engine was the very 1st six stroke engine model carried out,

which then seemed to fail. Followed by Bazulaz, Crowers and Griffins' model of six stroke engines. Malcolm

Beare was the most successful inventor of six stroke engines.

The six strokes of the six stroke cycles are as follows:

- I. Intake stroke
- II. Compression stroke
- III. Ignition stroke
- IV. 1st Exhaust stroke
- V. Steam expansion stroke
- VI. 2nd Exhaust stroke



6 Stroke Engine Concept Design

- I. **Intake stroke:** The inlet valve open as the piston moves down from TDC to BDC which enters the air-fuel mixture into the chamber.
- II. **Compression stroke:** The inlet valve close as the piston moves BDC to TDC and compress the air / fuel mixture under pressure.
- III. **Ignition stroke:** The air/fuel mixture is then ignited , causing a small explosion which forces the

piston back down which turns the crank and provides the torque.

- IV. **Exhaust stroke** : In The exhaust stroke the exhaust valve open as the piston moves back up once again , pushing the by products of the fuel explosion out of the chamber out of the chamber.
- V. **Steam expansion stroke**: After the exhaust stroke in six stroke Engine the water inside the Extremely hot chamber the water Immediately turns to steam – expanding To 1600 times its volume –which Force the piston down for a **Second power stroke**.
- VI. **2nd Exhaust stroke**: In this stroke all the remaining vapors And gases are thrown away from the Chamber water vapors are collected by A condenser which is attached with the Exhaust port so that water can be used again.

Crankshaft

In four stroke engine, the crankshaft rotates about 720 degree while the camshaft rotates 360 degree to complete one cycle. But in six stroke engine the crankshaft must rotate 1080 degree to rotate the camshaft 360 degree to complete one cycle. Thus the gear ratio of six stroke will

be 3:1 instead 2:1 which is of four stroke engine.

The teeth of gear in crankshaft will be 18 and in camshaft the gear teeth will be 54.The gear used in this is helical type gear which gives high speed and high speed rotation.



Camshaft

When camshaft rotates 360 degree in six stroke engine, the cam has been divided into 60 degree among the six-strokes. There are two exhaust stroke, one will be at the time of fourth stroke through which hot gases or burnt gases are left out and the second one is at the six stroke which pushes the steam out.



OLD



NEW

ADVANTAGE

1. Thermal efficiency reaching 50% (30% for the actual internal combustion Engine).
2. Fuel consumption reduced by more than 40%.
3. Reduction of chemical, noise and thermal pollution.
4. Two expansion (work) through six stroke
5. Direct Injection and optimal fuel combustion at every engine speed.
6. We can eliminate the radiator.
7. We would get the better scavenging in fifth stroke.

DISADVANTAGE

1. High Initial cost Due to change in gear structure.
2. High Manufacturing cost in six stroke engine.

3. Engine size Increases Due to additional stroke in engine, fifth stroke and sixth stroke.

CONCLUSION

In this paper to convert a four stroke conventional engine in six stroke engine some modification is required. The modifications are the gear ratio between the crankshaft and the camshaft and also of the cam shaft. The six stroke engine modification promises dramatic reduction of pollution and fuel consumption of an internal combustion engine.

Due to water injection, the cooling system is improved. It enables lower engine temperature and therefore increases its overall efficiency. This is the main advantage of six stroke engine.

Using this technology by the automobile industry would have a tremendous impact on the environment and world economy, assuming up to 40% reduction in the fuel consumption and 60% to 90% in polluting emissions

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