



SNS COLLEGE OF TECHNOLOGY

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Department of Mechanical Engineering

Introduction of I.C. Engines

I C ENGINES

The Petrol engine and Diesel engine is used to generate power for an automobile. Such engines are also called as heat engines, which converts heat energy into mechanical energy.

According to the way of combustion of fuel, they are divided into two types: 1. External combustion engines 2. Internal combustion engines.

1.External combustion engines:

The combustion of fuel takes place outside the engine cylinder. The expanding gases produce heat energy and this heat energy is converted into mechanical energy as useful works. Eg. Steam Turbines.

2.Internal combustion engines:

The combustion of fuel takes place inside the engine cylinder. The expanding gases produce heat energy and this heat energy is converted into mechanical energy as useful work. Eg. Petrol engines, Diesel engines, Gas engines and Gas turbines. Now a days IC engines are mostly used.

Application of IC Engines:

- 1.IC engines are used in all road vehicles such as Automobiles, motor cycle, car, bus, trucks, tractors and road rollers.
- 2.They are used as portable stand by power units.
- 3.They are used in rail, aviation and marine transports.
- 4.They are also used as water pumps.

Basic parts of the I C engines:

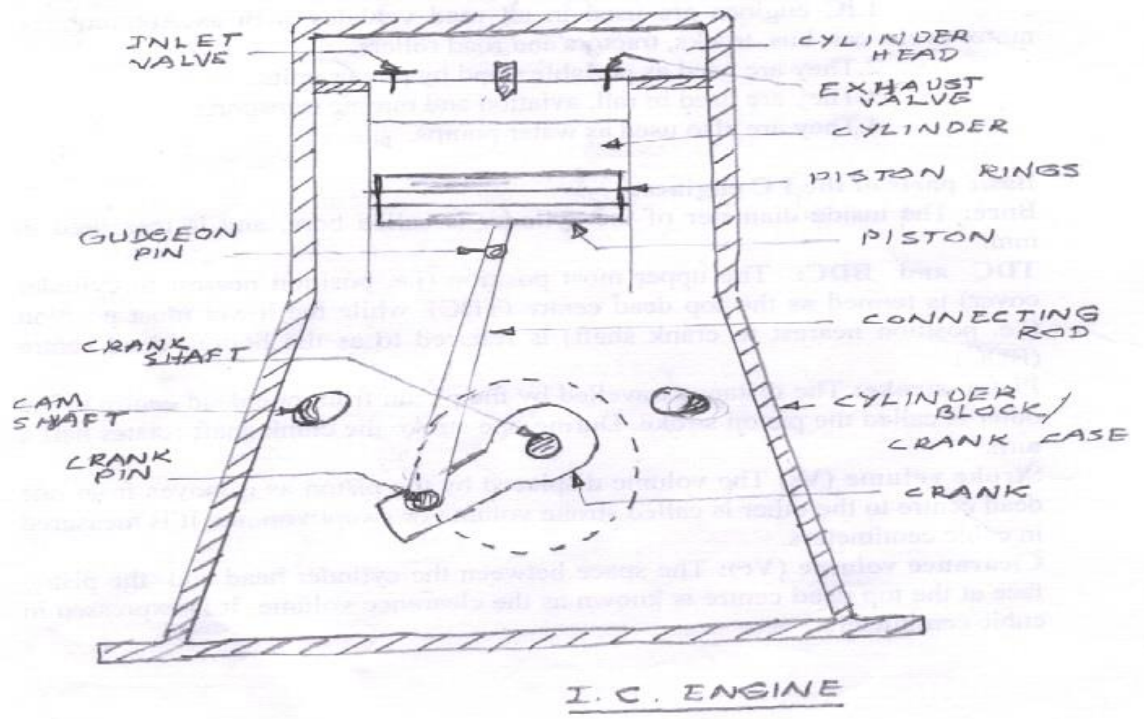
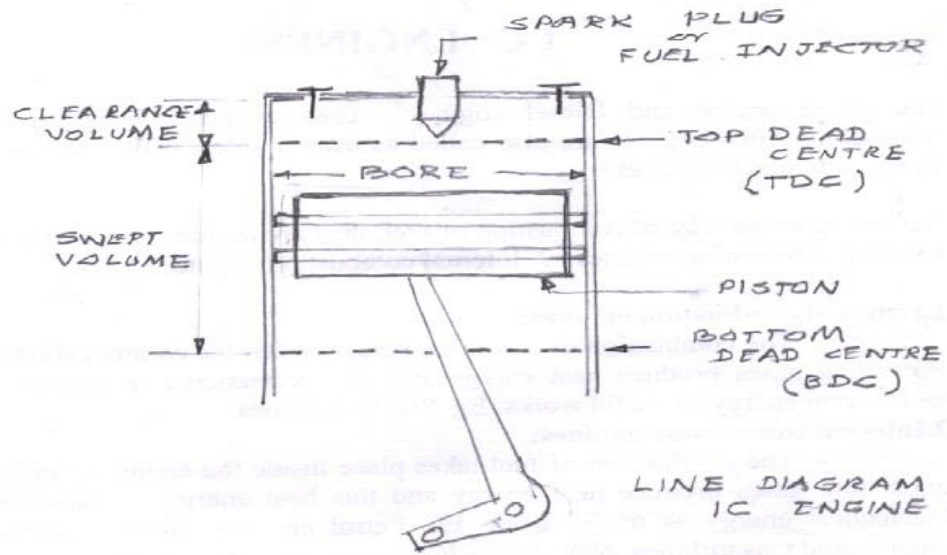
Bore: The inside diameter of the cylinder is called bore, and is measured in mm.

TDC and BDC: The upper most position (i.e. position nearest to cylinder cover) is termed as the top dead center (TDC), while the lower most position (i.e. position nearest to crank shaft) is referred to as the bottom dead center (BDC).

Piston stroke: The distance travelled by the piston from one dead center to the other is called the piston stroke. During one stroke the crank shaft rotates half a turn.

Stroke volume (V_s) The volume displaced by the piston as it moves from one dead center to the other is called stroke volume or swept volume. It is measured in cubic centimeters.

Clearance volume (V_c): The space between the cylinder head and the piston face at the top dead center is known as the clearance volume. It is expressed in cubic centimeters.



Compression ratio (rc): The ratio of the whole cylinder volume (i.e. volume of cylinder when the piston is at BDC) to the clearance volume is called compression ratio. The compression ratio varies from 7:1 to 15:1 for petrol engines and from 16:1 to 22:1 for diesel engines.

Classification of I C engine:

1. According to type of fuel used : Petrol engine, Diesel engine, Gas engine
2. According to the ignition method used: Spark Ignition (SI engines)
Compression Ignition (CI engines)\
3. According to the number of strokes per cycle: Two stroke, Four stroke.
4. According to air standard cycle : Otto cycle, Diesel cycle, Dual cycle.
5. According to number of cylinder: Single cylinder, Multi cylinders
6. According to position of cylinder: Horizontal, Vertical, Radial, 'V' engine
7. According to fuel supply system: Carburetor engine, Air-injection engine
Airless injection (or) Solid injection engine
8. According to cooling system: Air cooled, Water cooled
9. According to speed of engine: Slow speed, Medium speed, High speed
10. According to location of valves: Overhead valve, Side valve.

I C ENGINE CONSTRUCTION FEATURES:

The basic parts of the I C engine are 1.Cylinder block 2.cylinder 3.Cylinder head 4.Piston 5.Piston rings 6.Connecting rod 7.Gudgeon pin 8.Crank pin 9.Crank 10.Crank shaft 11.Cam shaft 12.Crankcase 13.Valves

1.Cylinder block: The cylinder block is the main body of the engine. It accommodates cylinder or cylinder liners, crank shaft, cam shaft. It is made of gray cast iron or aluminium alloys.

2.Cylinder: The cylindrical barrel in which the piston reciprocates is called cylinder. One end of the cylinder is closed with cylinder head where as the other end opens towards the crankcase. The cylinders are provided with liners which may be easily replaced whenever required. It is made of gray cast iron.

3.Cylinder Head: The cylinder head is bolted to one end of the cylinder and serves as a cover for cylinder. It accommodates valves, spark plug / fuel injector and provides combustion chamber. The cylinder head is made of gray cast iron or aluminium alloys.

4.Piston: The piston reciprocates in the cylinder to complete the cyclic events and transmit gas force to the crank shaft through connecting rod. The pistons are generally made of cast iron, aluminium alloy and cast steel.

5.Piston rings: This piston rings provide a tight seal between the piston and the cylinder wall. It prevents leakage of combustion gases. It is made with special cast iron alloy with chrome plating.

6.Connecting rod: It connects the piston and the crank, and transmits gas forces from the piston to the crankshaft. It transmits the reciprocating motion of the piston continuously to the rotary motion of crankshaft. It is made with alloy steels.

7.Gudgeon pin: It connects small end of connecting rod to piston.

8.Crank pin: Crank pin connects big end of connecting rod with crank. It transmits power from the piston to crank through connecting rod.

9.Crank: It is the link between connecting rod and crank shaft. It is connected to the connecting rod with the crank pin. It translate linear motion of the piston into rotary motion of crank shaft.

10.Crank shaft: The power developed in the cylinder is transmitted to the crank shaft through connecting rod and the crank. It transmits the power developed in the cylinder to driven shaft. It is made of forged steel.

11.Cam shaft: It is driven by the crankshaft by means of timing gears. The speed of the cam shaft is half the speed of the crankshaft. It operates inlet valve and outlet valves. It is made of forged steel.

12.Crank case: It is a stationary body of the engine. It serves as an enclosure for moving parts. It is made of gray cast iron or aluminium alloy.

13.Valves: Two valves are provided for each cylinder. 1.Inlet valve 2. Exhaust valve.