

JOB ROLE – AUTOMOTIVE SERVICE TECHNICIAN

Sector: Automotive
(Qualification Pack Code : ASC/Q1401)



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Unit 1: Automobile and their Components

Session 3 : Engine

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Session Objectives

1. The student will be to Able to explain importance of Engine and its classification .
2. Able to identify general components of a Engine and its uses .

Introduction

Engine is the heart of an automobile. Its role is very important. It converts the chemical energy to mechanical energy. This energy is utilized for vehicular movement.

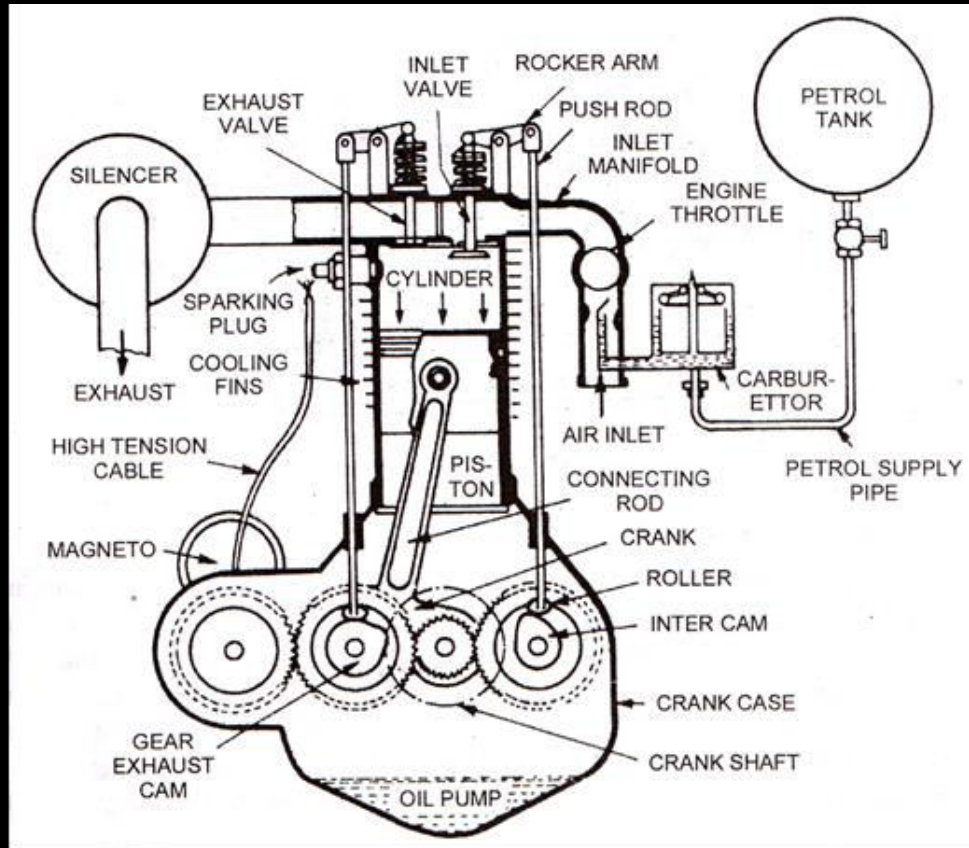


Fig : 4 – Stroke Petrol Engine

Classification of Automobile Engines

The engines for the automotive use may be classified according to the following considerations:

1. Cycle of Operation

- Otto Cycle Engine
- Diesel Cycle Engine

2. No. of Strokes Per Cycle

- Two Stroke Engine
- Four Stroke Engine

3. Types of Ignition

- Spark Ignition (SI) Engine
- Compression Ignition (CI) Engine

4. No. of Cylinders

- Single-cylinder Engine
- Two-cylinder Engine
- Three-cylinder Engine
- Four-cylinder Engine
- Six-cylinder Engine

6. Arrangement of Cylinders

- Inline Vertical Engine
- Horizontal Engine
- V-type Engine
- Opposed cylinder Engine
- Radial Engine

7. Valve Arrangement Engine

- L-head Engine
- I-head Engine
- F-head Engine
- T-head Engine

Cont....

8. Type of Cooling

- Air-cooled Engine
- Water-cooled Engine

In addition to the above classifications, the internal combustion engines are classified on the following bases also:

9. Speed

- Low Speed Engine
- High Speed Engine
- Medium Speed Engine

10. Method of Fuel Injection

- Carburetor Engine
- Air Injection Engine
- Airless or Solid Injection Engine

11. Method of Governing

- Hit and miss governed Engine
- Qualitatively governed Engine
- Quantitatively governed Engine

12. Application

- Stationary Engine
- Automotive Engine
- Locomotive Engine
- Marine Engine
- Aircraft Engine

13. Special Type Engine

- Wankel Engine
- Automotive Gas Turbine

Technical Terms Used In Engine:

A number of basic terms are used to describe and compare engines. A few commonly used terms are described here.

- Top Dead Centre (T.D.C): This refers to the position of the crankshaft when the piston is in its topmost position i.e. the position closest to the cylinder head.
- Bottom Dead Centre (B.D.C): This refers to the position of the crankshaft when the piston is in its lowest position i.e. the position farthest from the cylinder head.

Technical Terms Used In Engine:

- Bore: Diameter of the engine cylinder is referred to as the bore.
- Stroke: Distance travelled by the piston in moving from T.D.C. to the B.D.C is called 'stroke'.
- Clearance Volume: The volume of cylinder (including the combustion chamber) above the piston when it is in the T.D.C. position is referred to as 'clearance volume' (V_c).

Technical Terms Used In Engine:

- **Piston Displacement:** This is the volume swept by the piston in moving from T.D.C. to B.D.C. This is also called 'swept volume'. If 'd' is the cylinder bore and 'S' the stroke, the piston displacement, V_s is given by.
- **Engine Capacity:** This is the total piston displacement or the Swept volume of all the cylinders. If 'n' is the number of cylinders and V_s is the piston displacement, then 'engine displacement' or engine capacity V_d , is given by, $V_d = V_s.n$

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$$V_s = \frac{\pi d^2}{4} \cdot s$$

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Technical Terms Used In Engine:

- Compression Ratio: This indicates the extent to which the charge in the engine is compressed. This is calculated as the ratio of the volume above the piston at B.D.C. to the volume above the piston at T.D.C. If 'y' is the compression ratio, then

$$W_{si} = \frac{\gamma C}{\gamma - 1} dV^{\gamma - 1}$$

For petrol engines, compression ratios are about 8 to 9.5 : 1, whereas for diesel engines, these vary from 16 to 22.

Technical Terms Used In Engine:

- Power: It is the work done in a given period of time. Doing the same amount of work in a lesser time would require more power.
- Horse Power (H.P.): This is the amount of energy required to do 4500kgm. of work in one minute.
- Indicated Horse Power (I.H.P): The power developed within the engine cylinders is called indicated horse power. This is calculated from the area of the engine indicator diagram.

Technical Terms Used In Engine:

$$\text{F.H.P} = \text{I.H.P} - \text{B.H.P}$$

- **Engine Torque:** It is the force of rotation acting about the crankshaft axis at any given instant of time. It is expressed in newton-metre (Nm).

Engine torque goes through the vehicle transmission system, to the road wheels and is responsible for rotation of the latter and hence for pulling of the vehicle.

- Engine Torque:

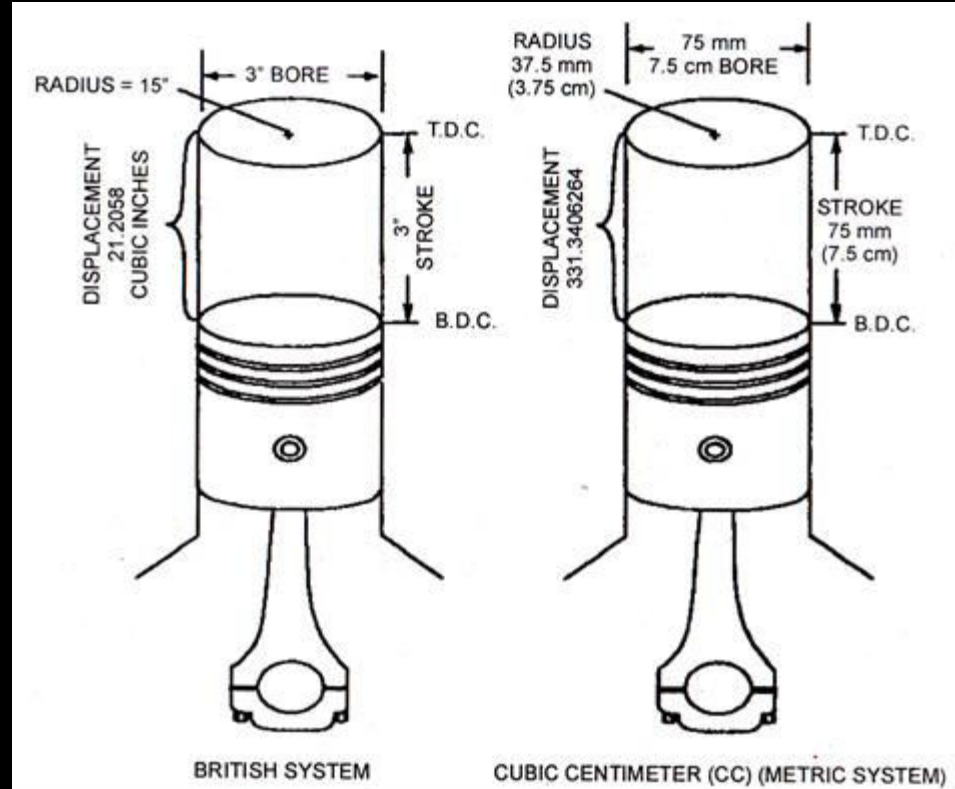


Fig : Engine Displacement

Summary

In this session , you have learnt about the Role of Engine in Automobile Vehicle. Engine is the heart of an automobile. Its role is very important. It converts the chemical energy to mechanical energy. This energy is utilized for vehicular movement. There are different ways of igniting fuel in an auto engine.

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