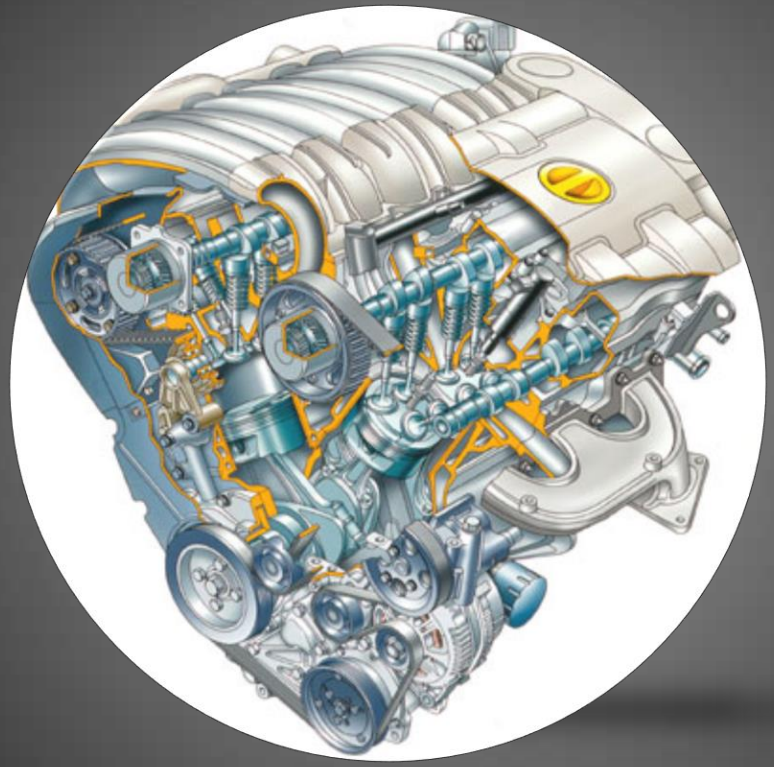
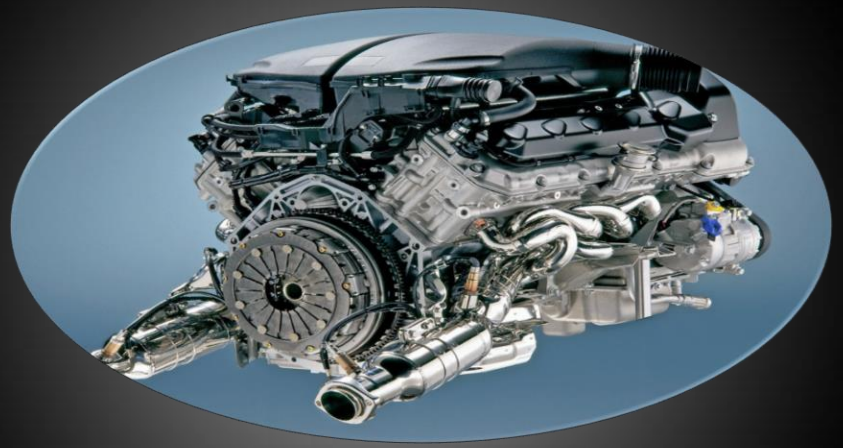


Engines

Section no.1: Introduction to engines

Section 1



Introduction

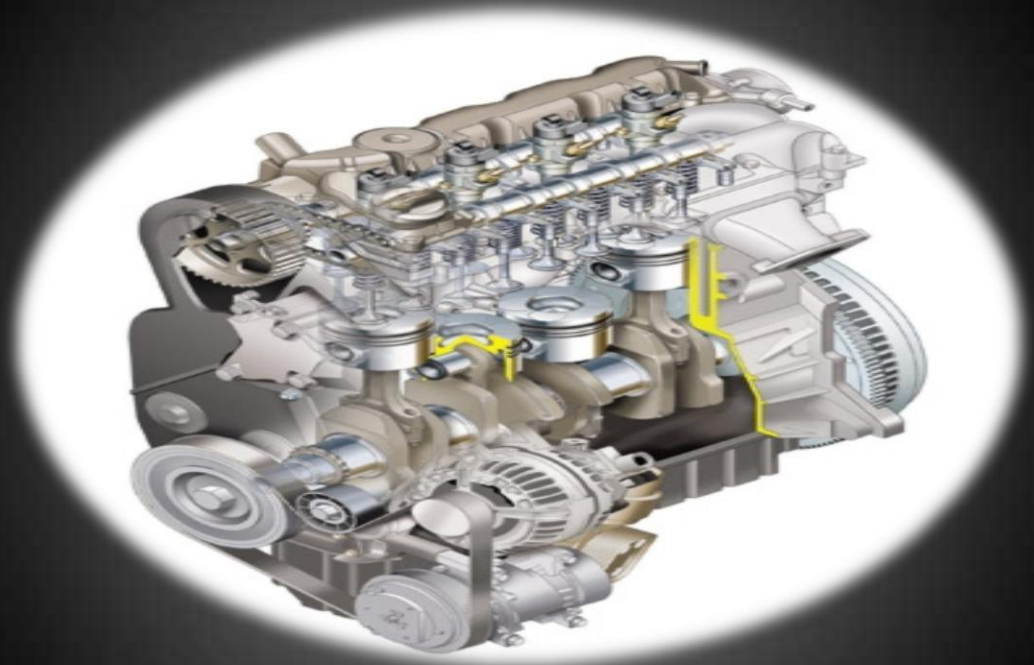
01

Definition of heat engines, How it works and its types?

Main internal combustion parts

02

Know the parts of engine



Introduction

Definition of heat engines, How it works and its types?

What is Heat engine?

Heat engine

Engine is a machine design to convert one form of energy into mechanical energy.

(Chemical – heat – mechanical)

How engines Work?

How engines work?

Heat engines burn fuel to create heat which is then used to do work.

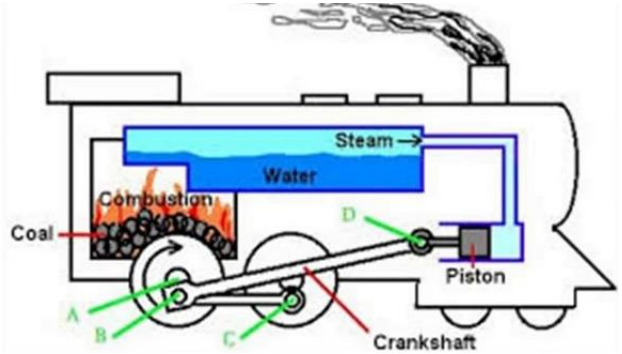
Convert heat from burning gas into the force that turns the wheels.

Types of heat engines

Heat engine classified as:

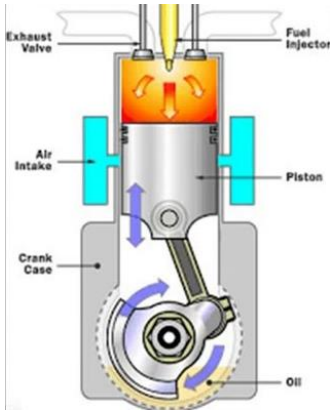
01 External combustion engine

Is a thermal power plant. Where fuel is burned and its heat is given to the water to generate steam which further used for power generation.

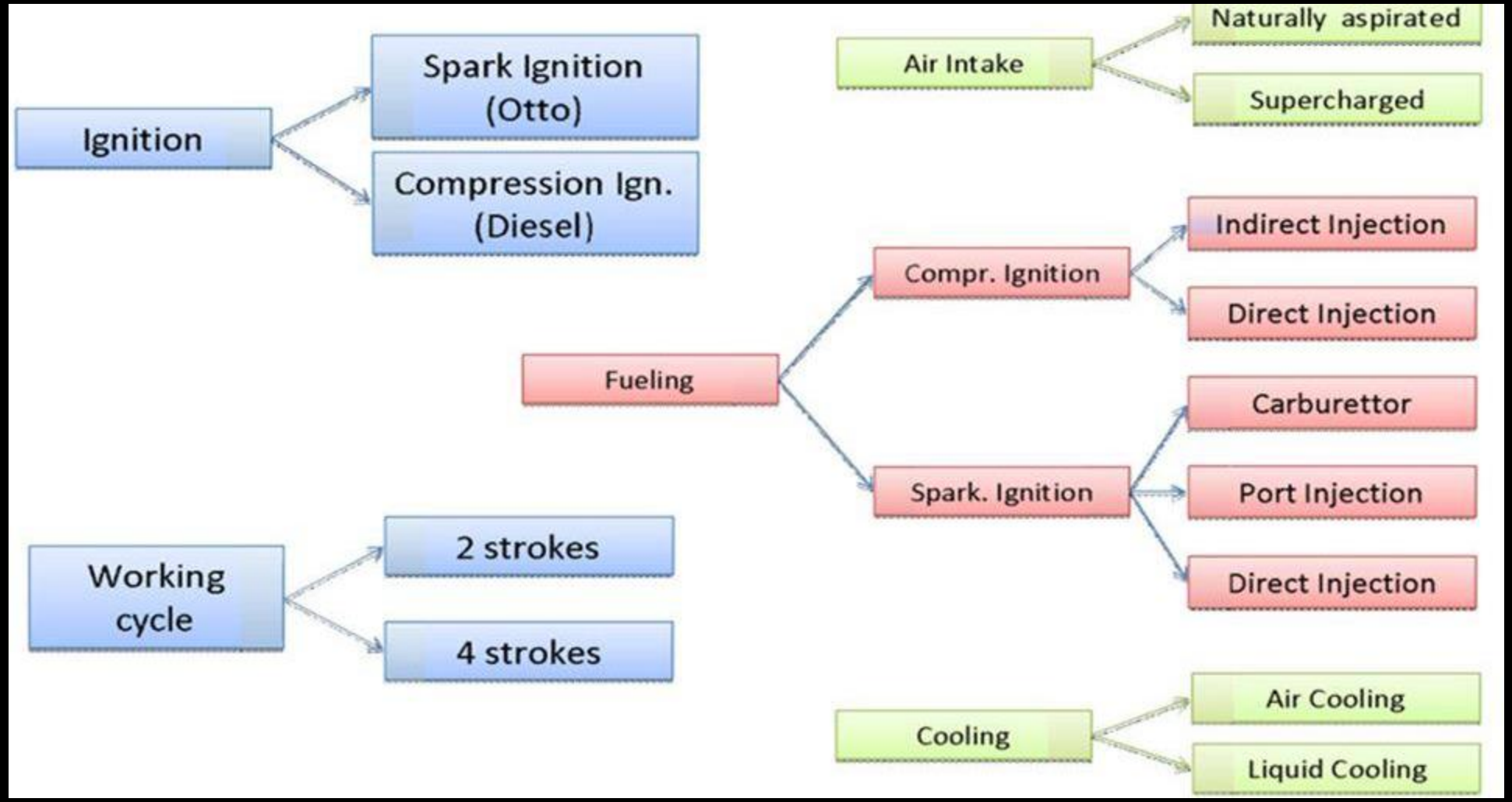


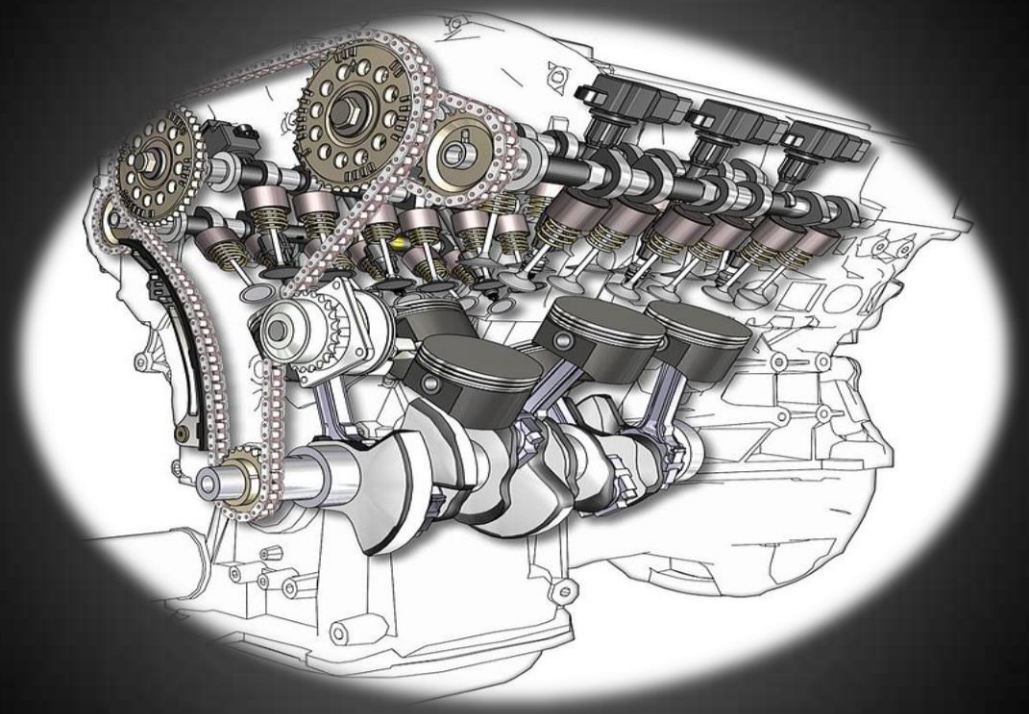
02 Internal combustion engine

Is a gas turbine plant. Where fuel is mixed with air and burned. The hot gases are passed through the power and then gases are exhausted.



Classification of IC engines

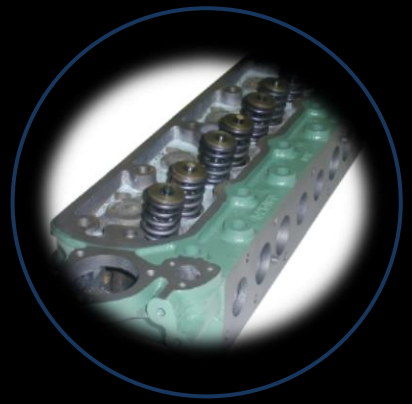




Mechanical Components of IC engine

Identify the sources of vehicle vibration

Upper engine end

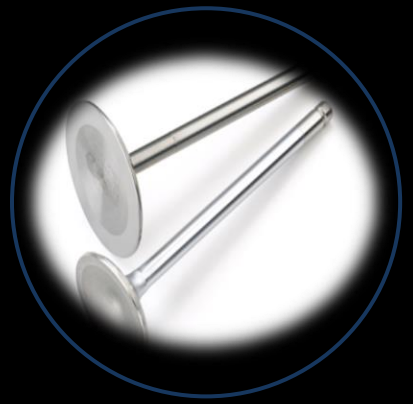


Cylinder Head

The cylinder head holds the injectors and valves.

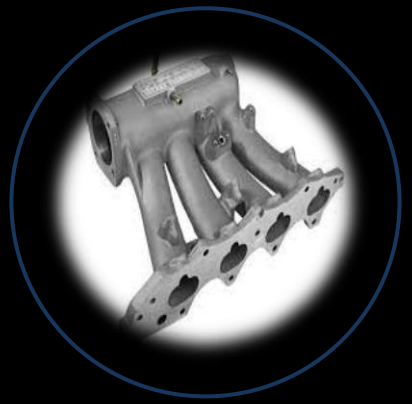
Cam Shaft

A camshaft is only a shaft on which cams are installed.



Valves

A valve is a device to close and open a passage.



Intake manifold

A tube for carrying the air-fuel mixture from to the engine intake port.

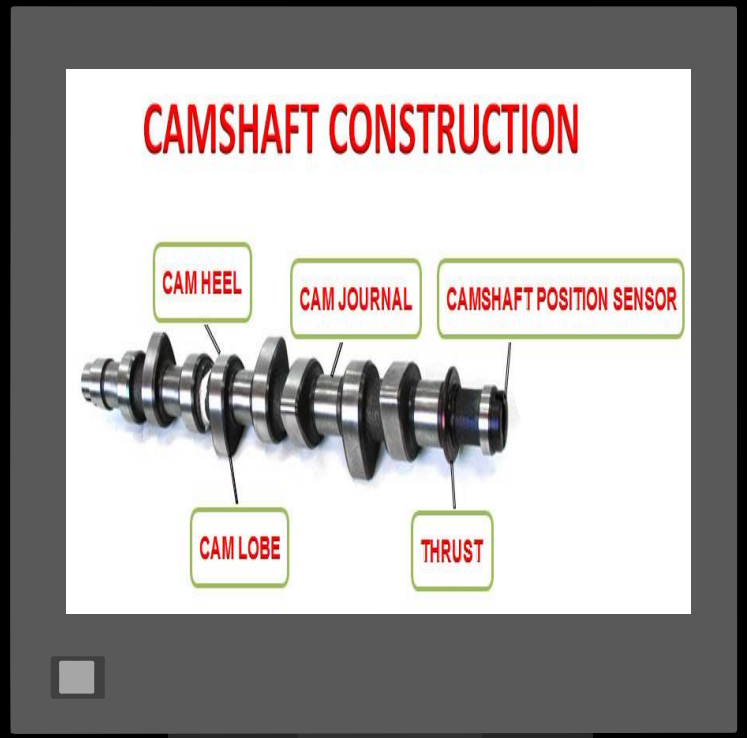
Exhaust manifold

A tube for removing the exhaust gases away from the engine cylinders.

Cylinder head

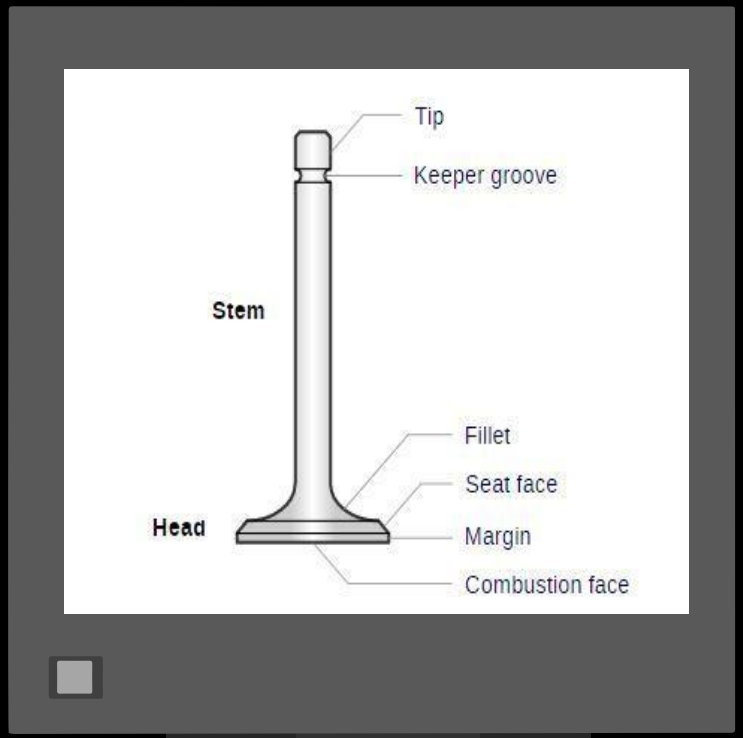
- In an engine, the top of the cylinder is closed with a separate cast piece called the cylinder head. The cylinder head is bolted to the upper part of the cylinder block. This joint is covered by a head gasket. It consists of a combustion chamber, spark plugs, and sometimes valves.
- In most engines, the cylinder head includes passages that deliver air and fuel to the cylinders, and which allow exhaust gas to exit. The cylinder head is usually made of gray iron or aluminum alloy.

Cam shaft



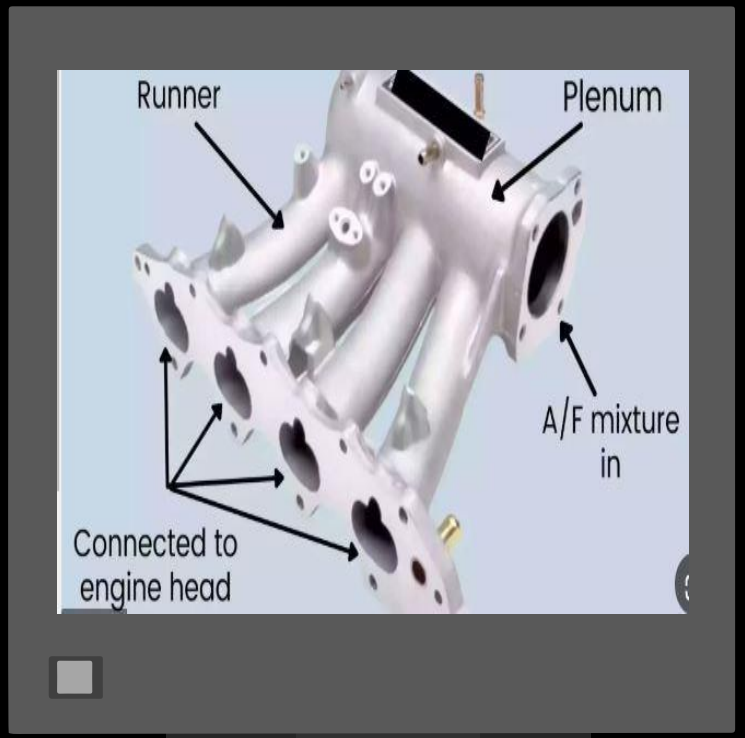
- A camshaft is responsible for opening the valves. A camshaft has several cams along with the length, two cams for each cylinder, one to move the inlet valve and the other to operate the exhaust valve.
- A cam is a device that changes the rotary motion of the camshaft into linear motion of the follower or filter. The cams have a high spot or lobe. The follower riding on the cams will move away from or towards the camshaft as the cam rotates.

Valves



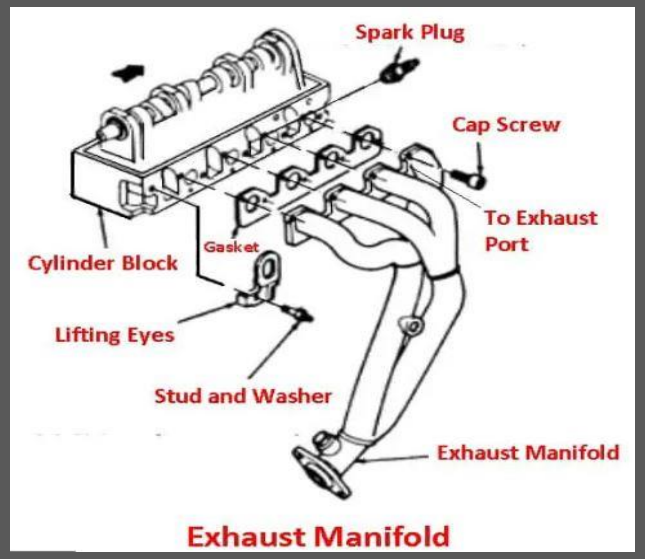
- A valve is a device to close and open a passage. Engine valves are devices that are used in internal combustion engines to allow or stop the flow of fluid or gas from cylinders or combustion chambers during the engine while the engine is operating.
- In motor vehicle engines, two engine valves are used for each cylinder-an inlet (or intake) valve and an exhaust valve.

Intake manifold



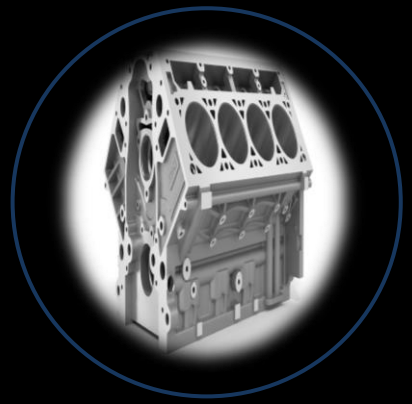
- The intake manifold is a cast iron or aluminum tube for carrying the air-fuel mixture to the engine intake port.

Exhaust manifold



- The exhaust manifold is a tube for removing the exhaust gases away from the engine cylinders.
- It collects exhaust gases from the exhaust ports of the various cylinders and conducts them to a central exhaust passage.

Bottom engine end



Cylinder Block

The foundation of the engine and contains pistons, crankshaft, cylinders.

Crank Shaft

An essential part of the power transmission system

Piston Assembly

It helps to convert the chemical energy obtained by the combustion of fuel into useful mechanical power

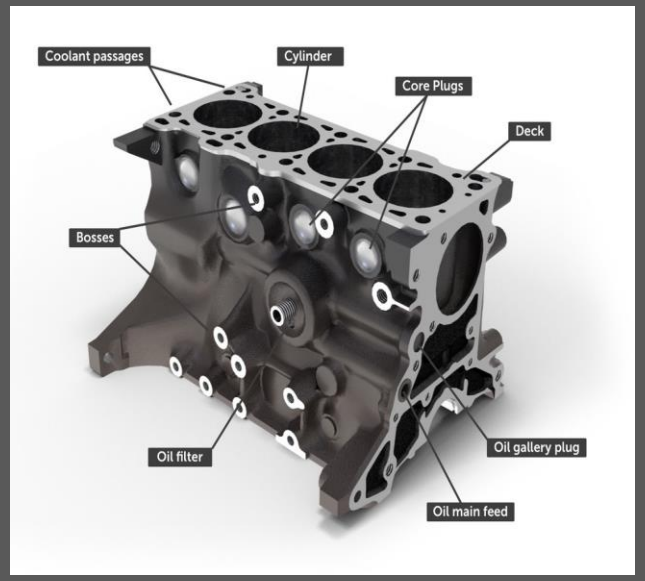
Oil Pump

used for connecting, breaking, or changing the connections in an electrical circuit.

Oil pan

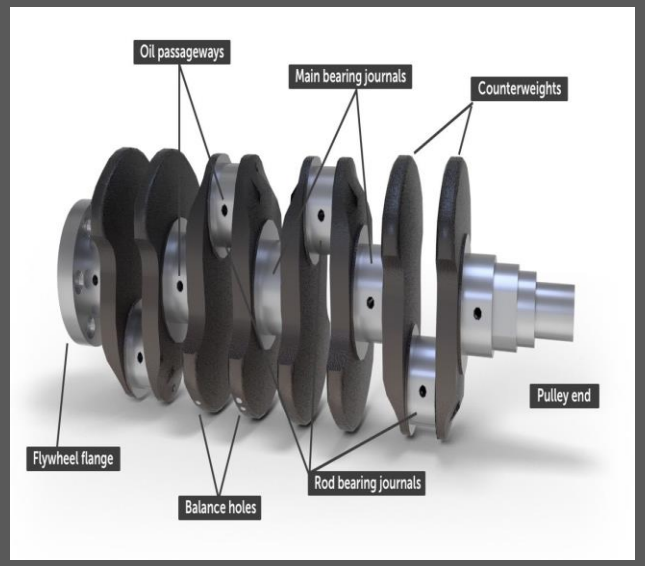
That encloses and covers the bottom of the cylinder block.

Cylinder block



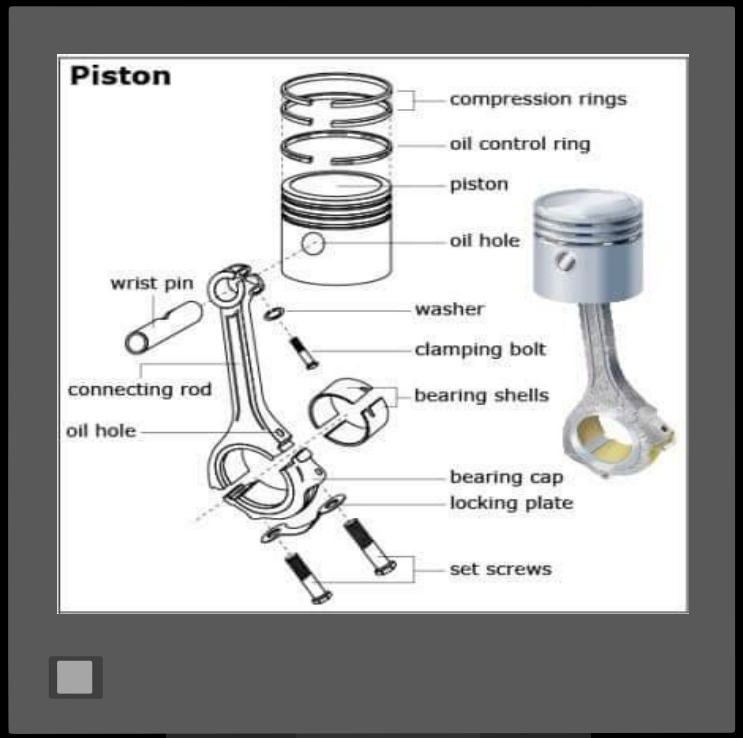
- An engine block is a structure that contains cylinders, and other parts of an internal combustion engine.
- Engine blocks also often include elements such as coolant passages and oil galleries.

Crank shaft



- an essential part of the power transmission system.
- In which, the reciprocating movement of the piston is converted into the rotating movement by using the connecting rod.

Piston assembly

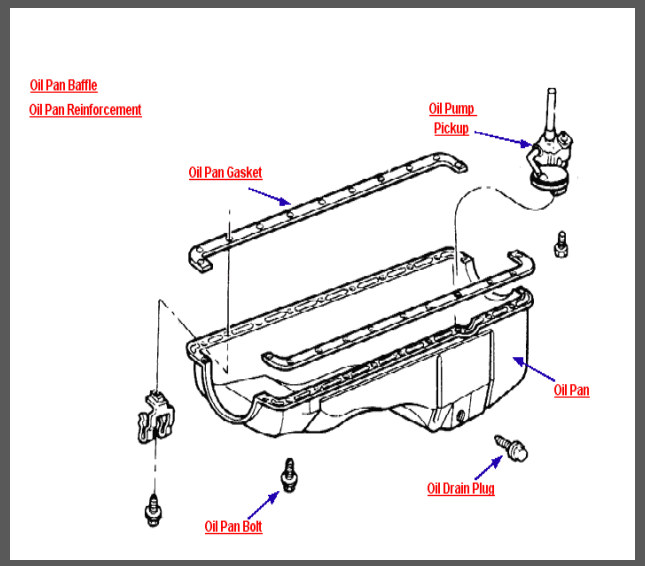


- The piston is the most essential part of a reciprocating engine. It helps to convert the chemical energy obtained by the combustion of fuel into useful mechanical power.
- The piston provides a means of conveying the expansion of the gases to the crankshaft, through the connecting rod, without loss of gas from above or oil from below.

Oil pump

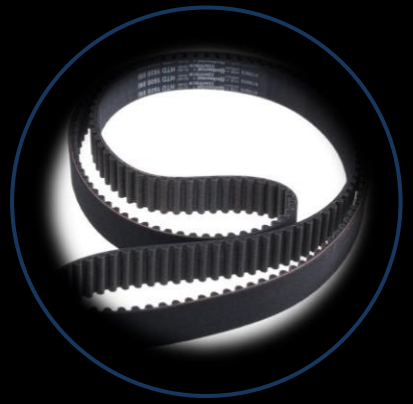
- The oil pump provides the force that delivers oil through galleries and passages around the engine.
- Oil pumps are usually either inside the oil pan and driven by a camshaft or outside the pan and driven by a crank shaft.

Oil pan



- The oil pan is attached to the bottom of the engine with bolts and is the reservoir for oil that gets pumped throughout the engine to lubricate, clean and cool moving parts.
- A pump forces the oil from the pan through a filter to remove dirt and other debris before it circulates through the engine.

Timing set



Timing Belt

Using belt tensioner pulley as a tension system

Timing Chain

Chain hydraulic tensioner

Engine Accessories

Water pump

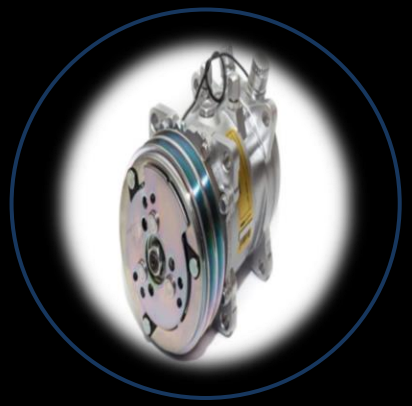
pushes coolant from the radiator through the coolant system, into the engine and back around to the radiator.

Steering pump

pressurizes the hydraulic fluid that helps the driver turn the steering wheel

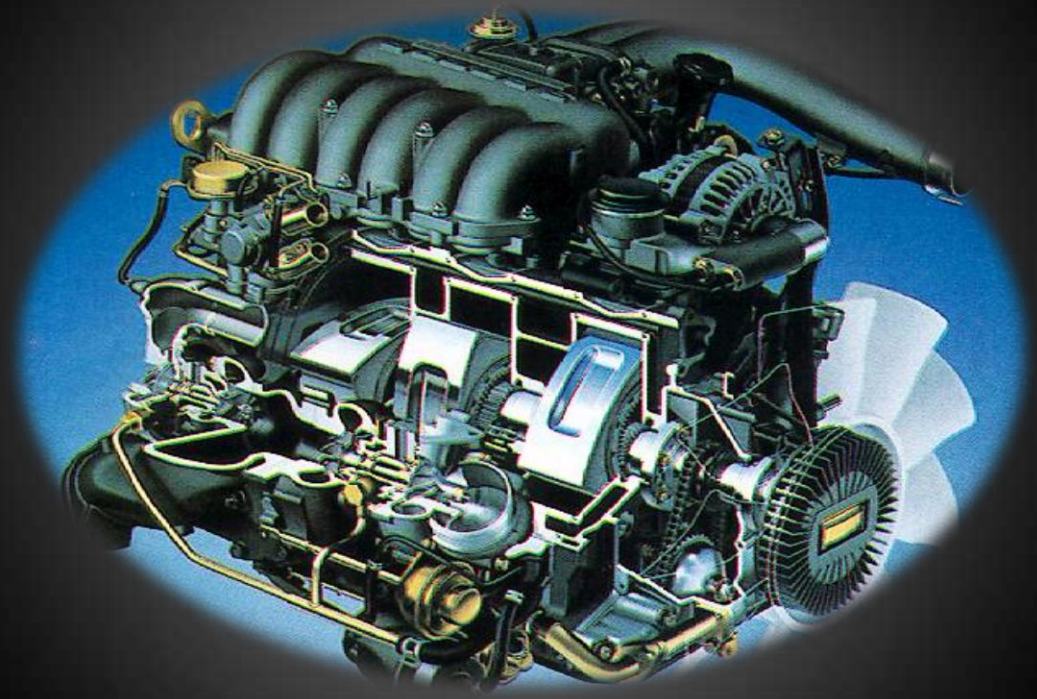
Alternator

you can charge and replenish the battery in your engine and other electrical components in a car.



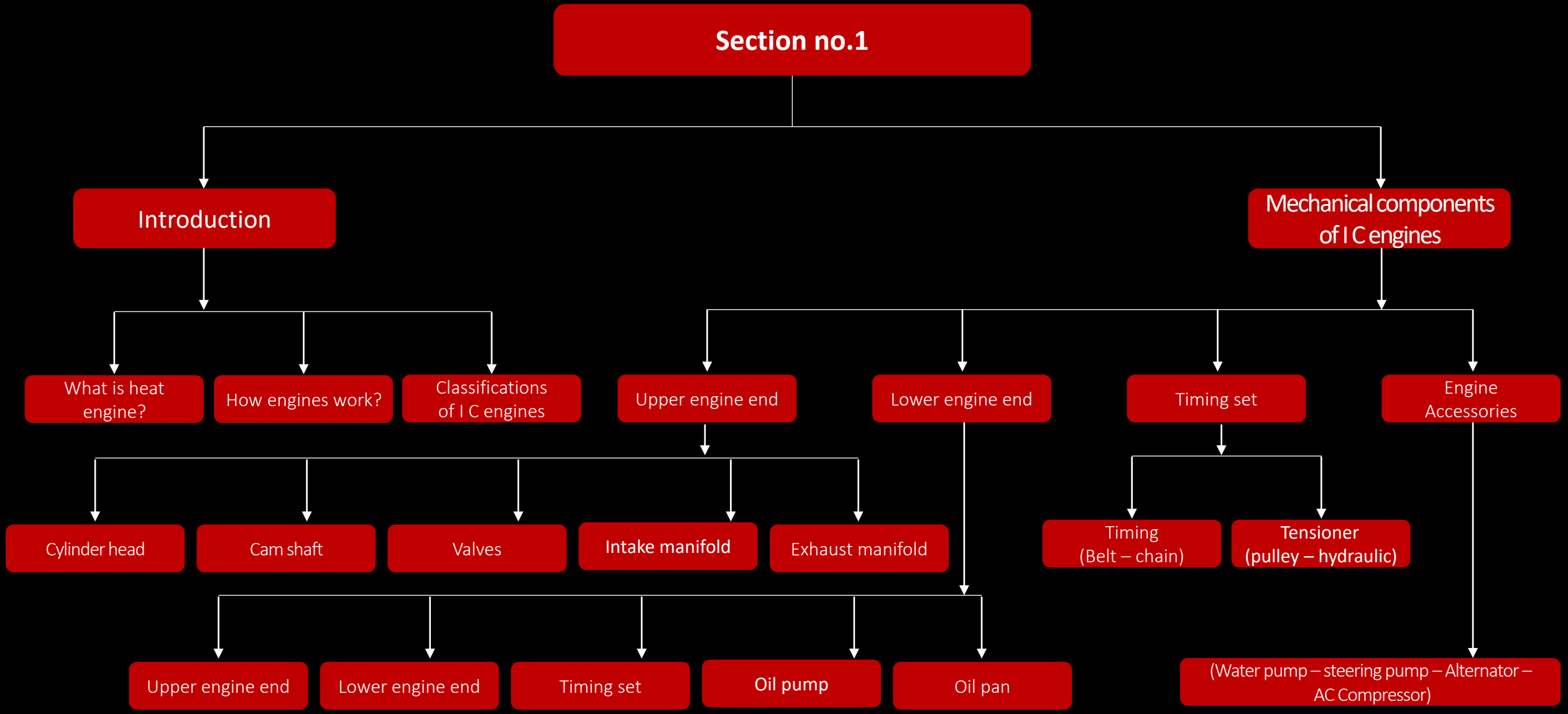
AC Compressor

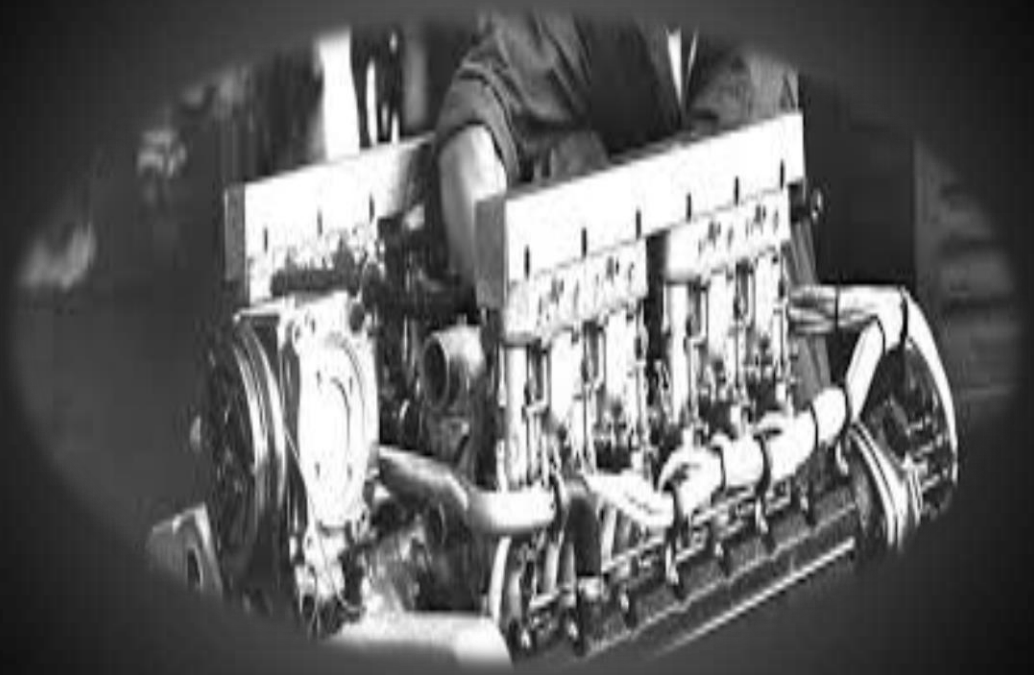
Is made to increase the temperature and pressure of the refrigerant inside the system when cooling



Summary

Summary


Section no.1
Introduction
Mechanical components of I C engines
What is heat engine?
How engines work?
Classifications of I C engines
Upper engine end
Lower engine end
Timing set
Engine Accessories
Cylinder head
Cam shaft
Valves
Intake manifold
Exhaust manifold
Timing (Belt – chain)
Tensioner (pulley – hydraulic)
Upper engine end
Lower engine end
Timing set
Oil pump
Oil pan
(Water pump – steering pump – Alternator – AC Compressor)



Activity

Activity

- **Report about Different Shapes of Engine Accessories (4 pictures for every part).**

With my best wishes

Eng./ Gamal Ahmed Hendy