

WEEK ONE AND TWO

TOPIC - Working of Two Stroke Cycle SI Engine (Petrol Engine)

The working principle of two stroke SI engine is described as follows:

1. Upward stroke

2. Downward stroke

1. Upward stroke (suction and compression):

The upward stroke consists of the suction and compression processes: During the first stroke, the piston moves upward from BDC to TDC. When the piston is at BDC, the partially compressed air fuel mixture from crank case enters into the cylinder through a transfer port as shown Figure 1.1(a). Then, the piston moves upward and compresses the air contained in it till the piston reaches TDC. At the end of the compression stroke, the spark plug produces the spark; it will ignite the compressed high pressure fuel air mixture. When the piston is at TDC, the inlet port opens and the air fuel mixture from the carburettor enters into the crankcase as shown in Figure 1.1(b). Thus, one stroke of the piston is completed.

2. Downward stroke (expansion or power and exhaust stroke):

When air fuel mixture is ignited, both pressure and temperature of the products of combustion will suddenly increase. Therefore, the piston receives power impulse from the expanded gas and it pushes the piston downward and it also produces the power stroke. This process is described in Figure 1.1(c). During expansion stroke, some of the heat energy produced is converted into mechanical work.

During downward stroke of piston, already entered air fuel mixture in the crankcase is partially compressed by the underside of the piston. This pre-compression process is called *crankcase compression*. At the end of power stroke, the exhaust port opens and burnt gases are sent out of the engine through this port as shown in Figure 1.1(d). At the same time, all burnt gases are not exhausted. Some portions will remain in the cylinder. When the piston moves to BDC, the fresh air fuel mixture from crankcase enters into the cylinder to sweep out the burnt gases. The process of sweeping out the exhaust gases with help of fresh air fuel mixture is known as *scavenging*. The scavenging helps to remove the burnt gases from the cylinder.

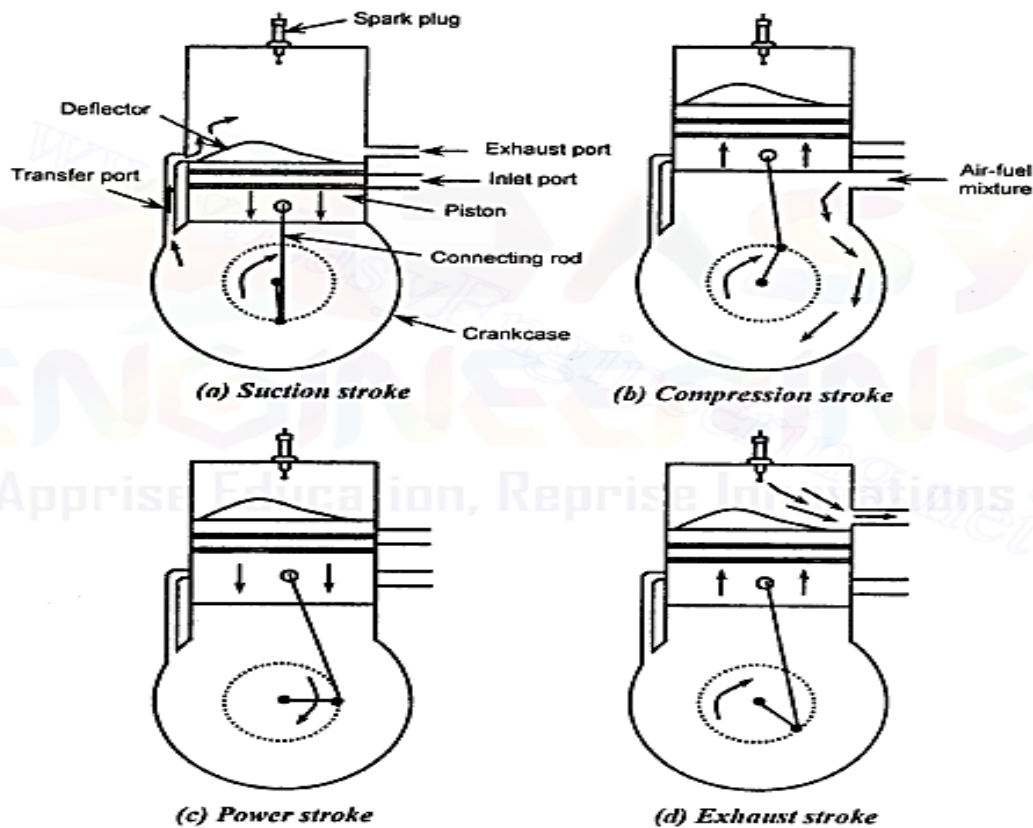


Figure 1.1 Working of two stroke SI engine

Working of Two Stroke Cycle CI Engine (Diesel Engine)

The working of two stroke CI engine slightly differs from SI engine. Instead of spark plug, the fuel injector is placed at the top of the cylinder.

1. First stroke:

In the first stroke, the piston moves from BDC to TDC. When the piston is at BDC, partially compressed air from the crank case enters into the cylinder through the transfer port as shown in Figure 1.2(a). Then, the piston moves upward and further compresses the air into high pressure and temperature till the piston reaches TDC. At the end of the compression stroke, the fuel injector injects the fuel in atomized form and automatically ignited by the compressed air. During the upward movement of the piston, a slight vacuum will be produced at the crankcase to suck the air from atmosphere as shown in Figure 1.2(b).

2. Second stroke:

When the fuel and air are ignited, it suddenly increases the pressure and temperature of the gas. Therefore, the gases will expand and push the piston downward and producing the power stroke as shown in Figure 1.2(c). During expansion, some of the heat energy produced is converted into mechanical work.

During downward stroke of the piston, it first uncovers the exhaust port and the burnt gases are sent out of the engine as shown in Figure 1.2(d). At the same time, all burnt gases are not exhausted. Therefore, the scavenging takes place in the cylinder.

At the time of downward movement of the piston, already entered air in the crankcase is partially compressed by the underside of the piston. This process is called *crankcase compression*.

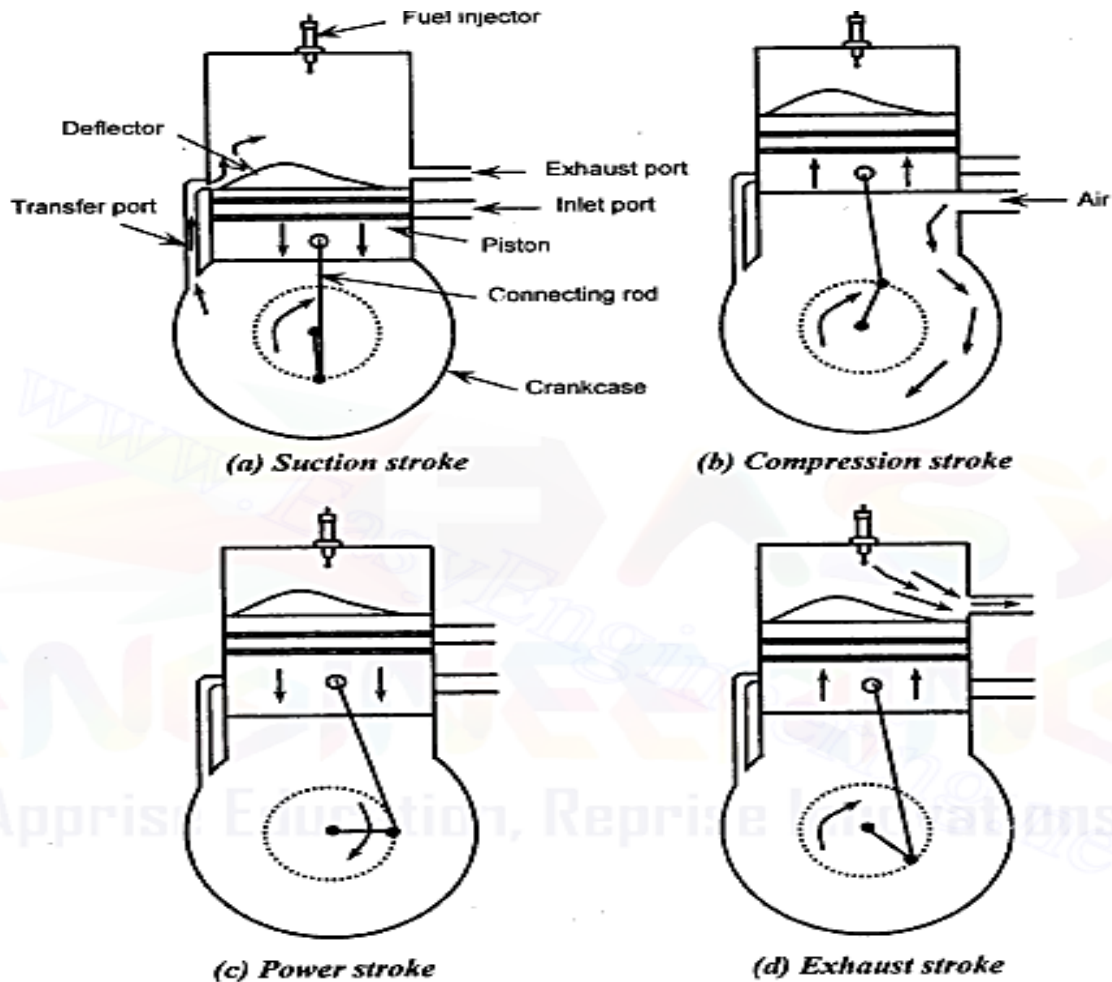


Figure 1.2 Working of two stroke CI engine

Evaluation

1. Classify IC engines according to cycle of operation?
2. State the two strokes found in 2 stroke engine?
3. Explain the operations of downward stroke in 2 stroke SI engine?

Assignment

1. Draw and label the operations of two stroke CI engine
2. Mention the main difference between two stroke SI and two stroke CI engine