

VALVE AND PORT TIMING DIAGRAMS

Valve timing Diagram

A valve timing diagram is a representation of the positions of the crank when the various operations as inlet valve opening, closing, exhaust valve opening and closing and also the beginning and end of various strokes

. The valves cannot open and close abruptly; it requires a finite period of time for its operation so a time advance is given for proper functioning. The timing of the valves is controlled by cam settings.

Valve timing for 4 stroke petrol (Spark Ignition) engine:

Now let us see the various position of the crank when the inlet and exhaust

valves during the various processes. Inlet valve opening: The valve timing is different for low speed and high speed.

The inlet valve opens before the piston reaches the TDC during the exhaust stroke. This is to ensure that the fresh charge enters the cylinder as soon the piston as soon as the piston starts to move down.

Actual valve timing diagram for actual valve timing diagram for lowhigh speed 4 stroke SI engine speed 4 stroke SI engine

Inlet valve closing:

The closing of the inlet valve takes place during the start of compression stroke (i.e. when the piston move from BDC to TDC after finishing suction stroke and the starting of compression stroke).

If the inlet valve is allowed to close exactly at BDC then less charge than the capacity enters during the suction stroke so the inlet valve closing is delayed to 20° - 25 degrees after the crank reaches the BDC position during slow speed and 40 - 50 degrees after the crank reaches the BDC position during high speed.

Exhaust valve opening:

The exhaust valve opens at the end of expansion stroke. The exhaust valve opening is done before the piston reaches the BDC so as to provide more time for all the burnt gases to escape.

The opening of the exhaust valve is necessary because if there are some burnt up gases left in the cylinder it may affect the cylinder walls and the spark plug. So the exhaust valve is opened 30 - 35 degrees before BDC for slow speed and 45 - 50 degrees before BDC for high speed.

Exhaust valve closing:

The exhaust valve closing is also important to let out all the burnt gases. The time between the exhaust valve opening and the exhaust valve closing determines the amount of burnt gases that escapes.

Usually the exhaust valve is closed 8° - 10° after the piston reaches the TDC position. An important phenomenon in the valve timing diagram is the angle of overlap.

The angle of overlap is the angle for which both the inlet valve and the exhaust valves remains opened. Thus it can be seen that from the diagram the

angle of overlap during slow speed is $5+8=13$.

The crank position at which ignition occurs is also indicated in the valve timing diagram. The ignition is provided 38° - 40° before TDC during compression.

Source : <http://mediatoget.blogspot.in/2011/10/components-of-ic-engines.html>