



# **SNS COLLEGE OF TECHNOLOGY**

(An Autonomous Institution)

COIMBATORE-35.



- Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

## **DEPARTMENT OF AUTOMOBILE ENGINEERING**

# **23AUT202 – AUTOMOTIVE ENGINES AND EMISSION CONTROL**

**II YEAR / III SEMESTER**

**Topic – Importance of Swirl, Squish and Turbulence**



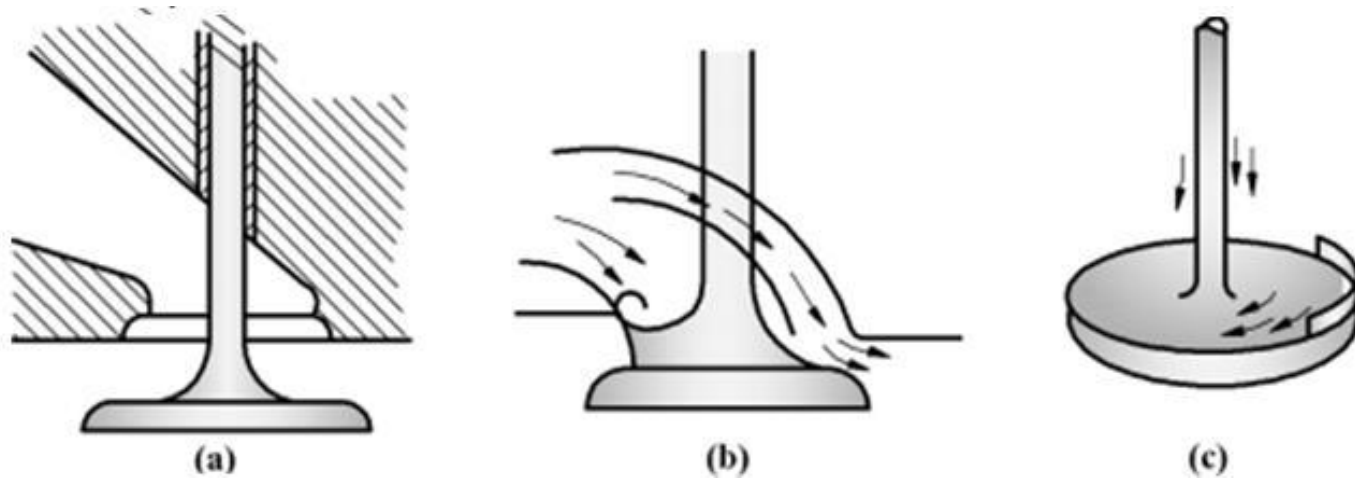
- In the C.I engine during induction, suction, and compression only air is there and fuel is injected at the end of compression.
- The time available for vaporization and mixing with air is very limited. Also for better mixing and better combustion air swirl is required which gives better combustion.
- For better combustion atomization, vaporization and proper mixing with air is required in minimum time and result of all these give high power, better efficiency, smooth and noiseless engine running, and shorter delay period which reduces probability of knocking.
- To achieve all of the above advantages the design of C.I engine combustion chamber becomes more complicated and swirl is very important in the C.I engine.



# Air Swirl

- For proper mixing of fuel and air in the combustion chamber the various methods of air movement are employed called air swirl. Various types of air swirl are being discussed below

## Induction Swirl



*Different methods of achieve induction swirl*

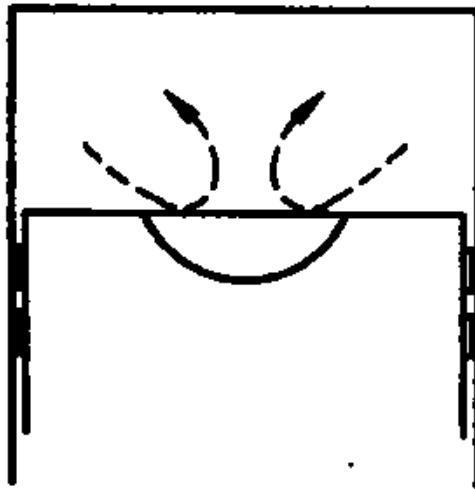


- In this method swirl is provided to incoming air to the cylinder during suction, that's why it is known as induction swirl.
- Different methods of giving swirl to incoming air are shown in fig in which air enters at some angle and gets the swirl.
- Fig (b) shows a masking or shrouding one side of the inlet valve, so that air enters only around the part of periphery of the valve and air swirl is produced. The angle of mask used usually varies from  $90^\circ$  to  $140^\circ$ .
- The best tangential direction of air movement can be obtained by turning the valve around its axis.
- Fig (c) illustrates the method of producing air swirl by casting a lip on one side of the inlet valve. Air enters from the top and due to lip it gets the swirl.

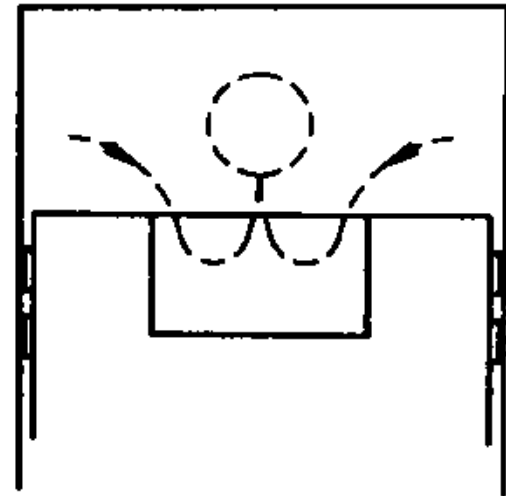


# Compression Swirl

- In this method air swirl is produced during compression stroke. At the top of the piston different types of cavity is formed which gives different type of swirl during compression.



(a)



(b)



# Combustion Induced Swirl

- In this method swirl is produced by high pressure generated during first part of combustion of fuel.
- The piston head have different types of design which help to generate the swirl during combustion.
- This method is employed in pre-combustion and air cell combustion chamber designs.



*Thank You !*