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-:-Introduction-:-

Engine :-

Engine is a device which converts one form of energy into the other useful form.

Heat Engines → CE → HE. → mech. work.

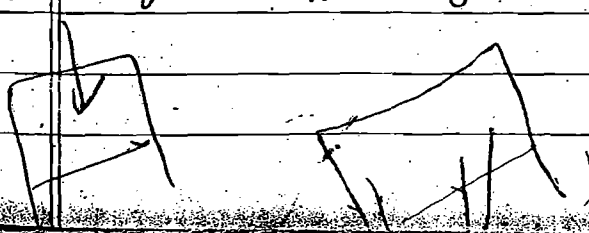
Engines are broadly classified as external combustion engines & Internal combustion engines.

* 1. External combustion Engine
* 2. Internal combustion Engine

In External combustion engines the products of combustion tranfer heat to working fluid whereas in IC engine the products of combustion produce power directly in the same cylinder.

Advantages of I.C. Engines :-

1. Mechanical simplicity
2. Higher power to weight ratio
3. Low initial cost due to the absence of boiler, condensor etc.
4. Higher efficiency.



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Engine Nomenclature :-

Top Dead centre (TDC)

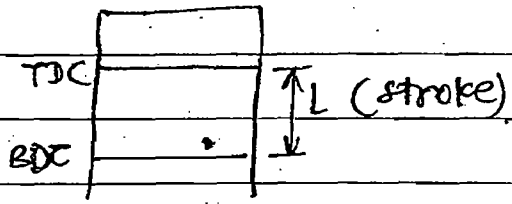
It is the dead centre when piston is ~~nearest to~~ Farthest from the crankshaft (It is equal to I.D.C. in case of horizontal engines)

Bottom dead centre (BDC)

It is the dead centre when piston is nearest from the crankshaft (it is equal to O.D.C. in case of horizontal engines)

Stroke (L)

The distance b/w two dead centres is known as stroke.



Displacement Volume (or) Swept Volume (V_s)

Swept volume $V_s = \frac{\pi}{4} D^2 \times L$

D = Bore (or) inner dia. of cylinder

Clearance the TDC.

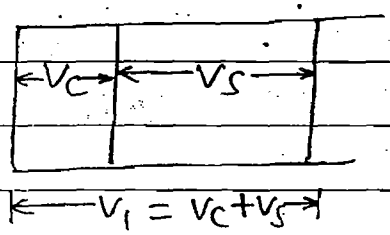
Compr volu after

Clearance volume (V_c)

It is the volume of the cylinder when the piston at TDC or BDC.

Compression ratio (CR or r)

It is define as volume before compression to the volume after compression.



$$r = \frac{V_1}{V_2} = \frac{V_c + V_s}{V_c} = 1 + \frac{V_s}{V_c}$$

$$\boxed{r = 1 + \frac{V_s}{V_c}}$$

Air Standard Cycles

(or) (Ideal I.C. engine cycles)

(i) (Const. Volume Cycle)

Assumptions made in Air Standard Cycles:-

1. The working substance is air and it behaves as an ideal gas.
2. The working substance is of fixed mass. (closed system analysis)
3. The specific heats of working fluid remains Constant. (γ remains constant)
4. The working fluid does not undergo any ~~chang~~ chemical change.
5. All the processes are reversible processes.

$$r = \frac{\text{vol. before compression}}{\text{vol. after compression}}$$

$$r_c = \frac{\text{vol. after heat addition}}{\text{vol. before heat addition}}$$

P

V

V_2

1-2

2-3

3-4

4-1

* clockwi

* Anticlock

Note:- Swept