



KNOCKING IN CI ENGINE

- ✚ If the delay period is long, a large amount of fuel will be injected and accumulated in the combustion chamber.
- ✚ The auto-ignition for this large amount of fuel may cause high rate of pressure rise.
- ✚ This high pressure rise cause the heavy vibration of the engine and creates lot of noises.
- ✚ This phenomenon of combustion causing heavy pressure rise during uncontrolled combustion is known as diesel knock.
- ✚ Diesel knock generally starts at the very beginning of the combustion process due to sudden auto-ignition of large amount of fuel whereas the knocking in the SI engine generally starts at the end of the combustion period.
- ✚ While comparing the phenomenon of detonation in SI engines with that of knocking in CI Engine, the two phenomenon are fundamentally similar which purely depends on the auto-ignition subject to the ignition time-lag characteristics of the fuel mixture.
- ✚ In SI engine, the knocking occurs at the end of the combustion whereas in CI engine, knocking occurs at the very beginning of the combustion.
- ✚ The detonation in the SI engine is of a homogeneous charge causing very high rate of pressure rise and very high maximum pressure. In the CI engine, the fuel and air are heterogeneous and hence the rate of pressure rise is normally lower than that in the detonating part of the charge in the SI engine.
- ✚ In the CI engine, the fuel is injected into the cylinder only at the end of the compression stroke, there is no question of pre-ignition or premature ignition as in SI engine.
- ✚ In SI engine, it is easy to identify the noise difference of knocking and non-knocking operation by human ear. But in CI engine, it is too difficult. Because the normal ignition itself give audible noise by rate of pressure rise per degree of crank angle.
- ✚ In CI engine, the excessive vibration in engine structure, in the opinion of the observer, the engine is said to knock. There is no definite distinction between normal and knocking combustion.

METHODS TO PREVENT THE DIESEL KNOCK

- ✚ By reducing the delay period by doping, e.g. adding 1% of ethyl nitrate or any nitrate so as to accelerate the combustion.
- ✚ By increasing the turbulence of the compressed air injected, promoted homogeneous mixture by strapping the fuel from the spray.
- ✚ By arranging the fuel injector in such a way as to inject only a small quantity of fuel in the beginning.



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- ✚ By Supercharging i.e., increasing the inlet pressure of air.
- ✚ By increasing the injector pressure it encourages the atomization of fuel.
- ✚ By increasing the compression ratio to produce a temperature much higher than that required for the spontaneous ignition of the fuel.