Cylinder deactivation

Cylinder deactivation refers to a system which reduces the fuel consumption of internal combustion engines. Its function involves some of the cylinders in the engine being temporarily stopped.

Function

In nearly all petrol engines, cylinder deactivation systems enable cylinders which are not required to be shut off in partial-load operation. When the driving situation permits cylinders to be deactivated, such as when there is a moderate engine torque requirement on rural roads, the engine shuts off some of the cylinders. This deactivation means that the cylinders which remain active must continue to generate the torque of the cylinders which have been deactivated. For the cylinders still in operation, this results in a higher load point which is thus optimised for efficiency: an engine has a specific degree of efficiency at every load point. The optimum degree of efficiency is in the medium rpm range, although this depends on the engine design, control system and so forth.

The requirements for cylinder deactivation are as follows:

- Torque neutrality
- Emissions neutrality
- Good responsiveness

The switch between full-engine operation and cylinder-deactivation mode must take place seamlessly. To do so, the engine control system evaluates all data which are relevant for switching between the two modes and gives clearance for the switch to take place. In addition, it interconnects all actuators required for controlling the switch between engine operating modes.

Cylinder deactivation begins with the identification of the first cylinder to be shut off. The remaining cylinders are shut off in the order of ignition. When the gas exchange is deactivated for the first cylinder, the fuel injection into the remaining cylinders is also deactivated. It is particularly important that the ignition of the cylinders which continue to be active is switched to the earlier, optimum ignition time as soon as the first cylinder which has been shut off is no longer generating any torque.

Protection of the environment

The shift in load point and partial omission of the gas exchange (i.e. the exchange of combusted exhaust gas for fresh gas in the cylinder’s chamber) reduces fuel consumption and also CO2 emissions.

Images

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Source: https://www.my-cardictionary.com/dictionary/drive-system/cylinder-deactivation