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AutoSmart

Learn the facts: A cylinder deactivation system and its impact on fuel consumption

What is the issue?

Progressively more stringent greenhouse gas (GHG) emission standards for light-duty vehicles are in place in Canada, leading vehicle manufacturers to improve engine efficiency by using innovative technologies such as cylinder deactivation systems.

What do I need to know?

Cylinder deactivation systems (CDSs) are used typically in 6- or 8-cylinder engines. A CDS shuts down half of the engine's cylinders when only a small amount of the engine's power is needed, such as when the vehicle is moving at a constant speed on a level road, decelerating or going downhill. A CDS can reduce fuel consumption by 4 to 10%, saving you money and reducing your impact on the environment.

How do cylinder deactivation systems work?

- The "brain" of the engine is the electronic control unit (ECU). In a vehicle equipped with CDS, the ECU selectively deactivates cylinders by deactivating the intake and exhaust valves and fuel injectors. Although this practice reduces the power available, the engine does not need all of its cylinders to maintain the vehicle speed under constant throttle applications, such as highway or downhill driving.
- When more power is required (such as uphill driving or acceleration) the ECU reactivates the valves and fuel injector of the deactivated cylinders, which returns the engine to full power.
- Although no combustion occurs in the deactivated cylinders, their pistons continue to move, and oil continues to circulate. The energy cost to keep the pistons moving and oil circulating is outweighed by the fuel savings.

How can I help?

Be a knowledgeable buyer. Research before you buy and include a lifetime estimate of fuel consumption as a cost and performance requirement.

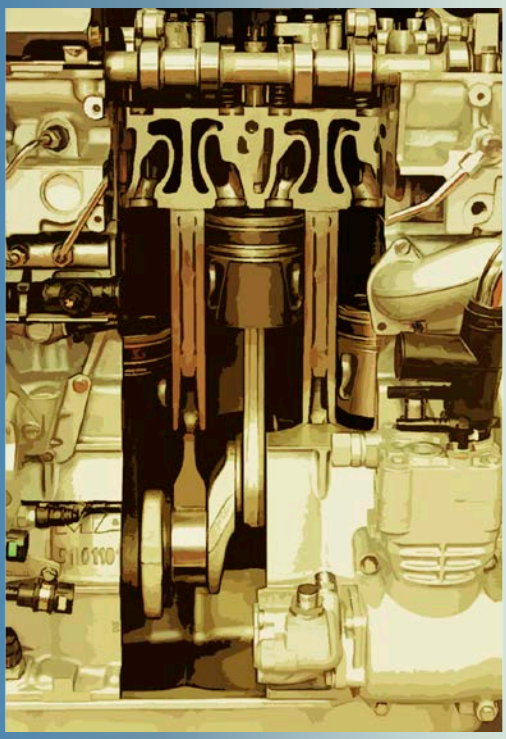

Figure 1: The components of a cylinder. When the CDS makes a cylinder inoperable it keeps the intake and exhaust valve shut and stops the fuel flow from the fuel injector. (Modified 2011)

What are the savings and benefits?

Improvements in engine technology and efficiency can save you money, as illustrated in the table below. A CDS can reduce fuel consumption and GHG emissions by 4 to 10% compared to conventional technology. Over 10 years, this reduction corresponds to fuel cost savings of $620 to $3,640 and carbon dioxide (CO_2) reductions of 1 100 to 6 440 kg. At the high end, this is equivalent to:

- nearly 1.5 Olympic-sized swimming pools of CO_2
- removing a large SUV from Canadian roads
- about 30% of our annual per capita emissions in Canada, which is 22.1 tonnes

Canada

Fuel consumption			Potential annual savings		Potential 10-year savings	
Average (L/100 km)	With a 4% reduction (L/100 km)	With a 10% reduction (L/100 km)	Fuel cost savings	CO_2 reduction	Fuel cost savings	CO_2 reduction
14.0	13.44	12.6	$146-364	258-644 kg	$1,460-3,640	2 580-6 440 kg
12.0	11.52	10.8	$125-312	221-552 kg	$1,250-3,120	2 210-5 520 kg
10.0	9.60	9.0	$104-260	184-460 kg	$1,040-2,600	1 840-4 600 kg
8.0	7.68	7.2	$83-208	147-368 kg	$830-2,080	1 470-3 680 kg
6.0	5.76	5.4	$62-156	110-276 kg	$620-1,560	1 100-2 760 kg

Note: For illustrative purposes, savings are based on an annual driving distance of 20 000 km, a fuel price of $1.30/L and a CO_2 emissions factor of 2.3 kg/L of gasoline.

Aussi disponible en français sous le titre : Les faits : Le système de désactivation des cylindres et son impact sur la consommation de carburant