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Process Description of an Internal Combustion Engine

Introduction

An internal combustion engine (ICE) is an engine that generates power by burning fuel with air inside the combustion chamber driving the pistons. For centuries many cars have used internal combustion engines as the source of power to drive the car. They have a great drivability

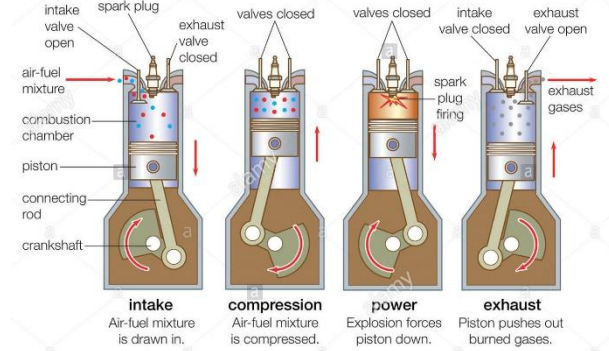


Figure 1

and durability with millions of highway transportation vehicles in the U.S that rely on them. The most common ICE is the four strokes, whose cycle is completed in four piston strokes. There are 4 main stages of an ICE. The first stage is intake, the second is compression, the third is power, and the fourth is exhaust. Figure 1 represents each of the stages of a ICE. All these stages are essential for the process of power to drive a car.

Process of the ICE

All ICE engines rely on combustion to create power to drive the vehicle. Combustion be can also known as

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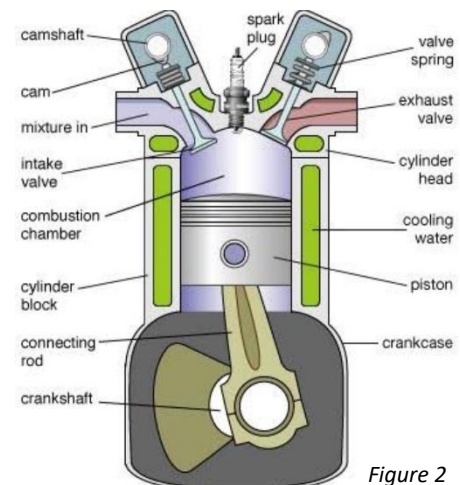


Figure 2

burning. Combustion is a chemical reaction when air fuel is burned. In an internal combustion engine (ICE), the ignition and combustion of the fuel occurs within the engine itself. (ENERGY, 2013, para. 2). For this process description, inline style engine four engine will be used to demonstrate combustions since it is the most common engine. An inline style engine is where the pistons is configured one behind another. Generally, an inline style should have 2 camshafts, 8 cams, and 4 spark plugs. One sparkplug for each cylinder chamber. A camshaft is a shaft to which a cam is fastened. In an ICE the camshaft it operates the valves, opening them or closing them. The sparkplug is a device for firing the explosive mixture in an internal combustion engine. It generates high voltage causing it to create a spark which then ignites the fuel and air mixture in an ICE.

Which then leads to the first stage of an ICE, the intake. During the intake stage, the cam rotates to compress the valve spring causing the intake valve opens allowing a mixture of air and fuel into the combustion chamber from the intake manifold. The combustion chamber is where the burning of the air and fuel take place and the intake manifold are multiple tubes that are bent to allow the fuel-air mixture flows from the carburetor or fuel injector to the intake valves of the cylinders of an internal-combustion engine. During this stage the crankshaft rotates to its up position causing the piston to be in the lowest position and the pistons are connected to the crankshaft by connecting rods in an ICE. Crankshaft also known as crank, is the part of the engine that changes up or down motion of the piston into rotation and are made out of strong materials to with stand the high level of stresses the combustion cause. Pistons in the engine are disks or short cylinder fitting closely within a tube in which it moves up and down against a liquid or gas. The connecting rod connects the piston to the crankshaft.

The next stage is compression, where the compression of the valve spring is released allowing the intake valve will close. The crankshaft the rotates back down which then causes the piston to be pushed back up, compressing the air and fuel mixture. The next stage is power. During this stage all the valves are closed, and the spark is created by the sparkplug, igniting the air and fuel. Which then pushes the piston back down. The last stage of an ICE is the exhaust. This time the other cam rotates to compress the valve spring causing the exhaust valve to open allowing the exhaust gas to leave through the exhaust manifold, it funnels the exhaust through tubes and ends in the back of the car. Which is the cylinder like tip you see in the back of a car. After that the cycle repeats itself repeatedly creating power and through a system of gears it drives the vehicle wheels.

Conclusion

The ICE is very important in modern century to provide a source of power to drive our vehicles. The first stage, intake draws in air and fuel into the combustion chamber. The second stage, compression. Where the piston moves up compressing the air and fuel. The third stage is power where the sparkplug ignites the air and fuel causing the piston to go back down. The final stage is exhaust where gasses leaves the engine through the exhaust pipe and the cycle will repeat itself again. Over the last decades, advancements in research and development has helped manufacturers reduce ICE emissions of dangerous pollutants, such as nitrogen oxides into the atmosphere. The research helped increase the ICE's horsepower but also have a good efficiency. Helping manufacturers maintain or increase fuel economy.



Figure 3: 2019 Toyota Prius

Manufacturer also begin combining ICEs with hybrid electric motors to increase fuel economy and extend the range of hybrid electric vehicles. One

example will be the Toyota Prius, and now many high-end companies like Lexus has implemented the hybrid system into there cars.

References

Internal Combustion Engine Basics. (2013, November 22). Retrieved from

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