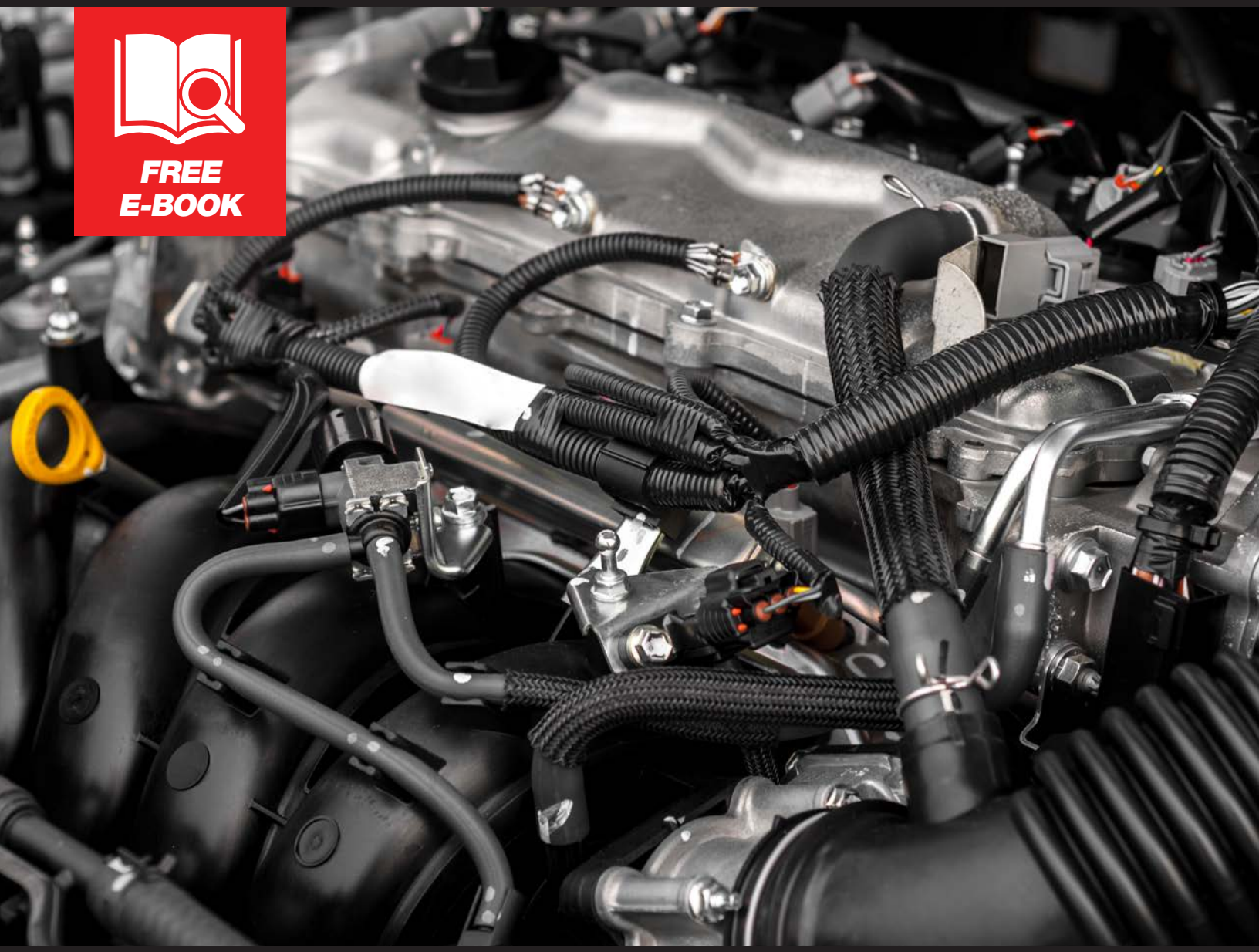
HOW A CAR ENGINE WORKS

FREE E-BOOK



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Every day you rely on your car to get you where you need to be. Just turn the key or press the start button and you're on your way. But how does your car actually work? What makes the engine go so you're able to get on your way?

Keep reading to learn more about what's going on under the hood during your drive.

How a Car Engine Works

Most cars and motor vehicles are powered by what's called an internal combustion engine. It uses the combustible combination of air, fuel, and a single spark to cause a small explosion. This reaction is recreated over and over again by parts that are in a constant rotation.

The first internal combustion engine was invented in 1859 by French engineer J.J. Etienne Lenoir. After nearly 200 years of the steam engine being the peak of modern innovation, he built the first continuously operational gasoline combustion engine.

Its basic principle is to draw in air through an intake valve, then have it enter a cylinder where it's combined with fuel. In most vehicles, that fuel is gasoline. Next, a reaction is created when the spark plugs light this combination. This tiny explosion is what creates the energy that powers your car.

The process is then repeated and the energy that was created leaves the chamber and exits your car through the tailpipe. There are a lot of parts that go into making this work and keeping this rotation going.

Parts of an Engine

An internal combustion engine uses motion to repeat the cycle. While it relies on an explosion to make everything go, the basic idea behind its rotation is similar to that of a steam engine or a water wheel. Some of the key parts are:

- ***Engine Block*** – This is the foundation for your engine. It's usually made of aluminum alloy or iron. The engine block is the home of your cylinders. All the motion that causes the combustion reaction takes place inside the cylinders. Most cars today feature a 4-cylinder engine, but many are also built with six or eight cylinders for more power.

- ***Valves*** – Each valve is crucial to moving air through your engine. There's both intake and outtake valves. Usually there's one of each for every cylinder. The valve train is the system that controls when air is brought in and when it's pushed out your exhaust at the end of the cycle.

- ***Pistons*** – Every one of your cylinders has a piston moving up and down inside it. This solid metal part is at the center of the combustion cycle.

- ***Crankshaft*** – The crankshaft is attached to the base of each piston by a connecting rod. The motion of the crankshaft is what's used to control when the pistons go up and when they come down.

- ***Spark Plugs*** – The spark plugs are located at the top of the cylinders. As their name suggests, they provide the spark to ignite the mixture of fuel and air.

- ***Timing Belt*** – To keep this cycle going constantly, the timing belt is hooked up to the crankshaft. This belt essentially creates a pulley system that's used to keep the rotation going.

- ***Camshaft*** – The top of the timing belt is hooked up to the camshaft. This part controls the motion of the valves. By stringing the timing belt between the consistently rotating crankshaft and camshaft, the engine repeats the cycle so that your vehicle can keep running.

All of these parts are essential to making an internal combustion engine function. They create the necessary reaction to power your vehicle and contribute to the rotational motion that made this cycle revolutionary.

Four-Stroke Combustion Cycle

Now that we've explored the parts that make up the engine and its cycle, let's look at the specifics of how it all comes together to create that explosive reaction.

Most automobiles run on a 4-stroke combustion cycle. This is also sometimes referred to as an Otto cycle. Besides being an appropriate sounding name, it's in honor of Nikolaus Otto, who first invented the cycle in 1867. There are four steps to the process:

1. The first motion is called the **Intake Stroke**. Here, the piston is at the top of the cylinder. The intake valve then opens to allow air in. The piston then lowers down to draw air into the cylinder.

2. Next there's the **Compression Stroke**. The valve closes, and the crankshaft drives the piston up again. This motion and the sealed intake valve force the air and fuel to compress and mix together.

3. The reaction takes place when the piston finally reaches the top of the cylinder. This is the **Combustion Stroke** or **Power Stroke**. At this moment the spark plugs do their job and create a spark, igniting the air and fuel mixture.

4. To complete the cycle, the piston then goes down again, and the outtake valve or exhaust valve opens up. This is known as the **Exhaust Stroke** because the piston will then force out all the exhaust from the reaction. This air ends up being pushed out your vehicle's tailpipe.

It's very likely that you'll find this type of engine and cycle under your hood. However, there are other types of engines and even different sizes and configurations of ones that use the four-stroke cycle.

Ignition System

While this is what's going on inside your engine during your drive, what happens when you turn your key in the ignition? How does the vehicle start and the whole process begin?

As you turn the key, an electric starter motor begins to spin. This energy is then transferred to the rest of the system by a part called a starter solenoid. This electrical charge is then transferred to a distributor. This part has an ignition wire connected to each one of the cylinders.

These ignition wires carry that energy and electrical current to the spark plugs where they create the charge and reaction to get your engine up and running.

Types of Engines

An engine that uses the four-stroke combustion cycle can still appear in a couple different ways. If you drive a sedan or a hatchback, you likely have an **inline engine** block. This means that all four of your cylinders are arranged standing upright and in a straight line.

Since power is generated in the cylinders, more cylinders means more power. Many muscle cars, trucks, and SUVs feature six or eight cylinders. Their engines are usually referred to as **V6** or **V8** because the cylinders are positioned at an angle that makes them form a V shape. Some V8 engines are built with a unique alternate design in their cylinders referred to as a hemispherical combustion chamber or **HEMI®**. A combustion chamber is where the fuel and air mix are ignited by the spark plugs.

In a typical engine, the combustion chamber is flat. By having a larger chamber that's shaped like half a sphere, more power can be created in each cylinder.

On the other end of the spectrum, a **2-stroke cycle engine** cuts the steps in half. It produces a combustible reaction every two strokes by removing the valves and igniting the spark plugs every time the piston reaches the top of the cylinder.

This makes 2-stroke engines very effective but, since they're smaller, they're most often used in tools like lawn mowers and chainsaws, as well as some motorcycles.

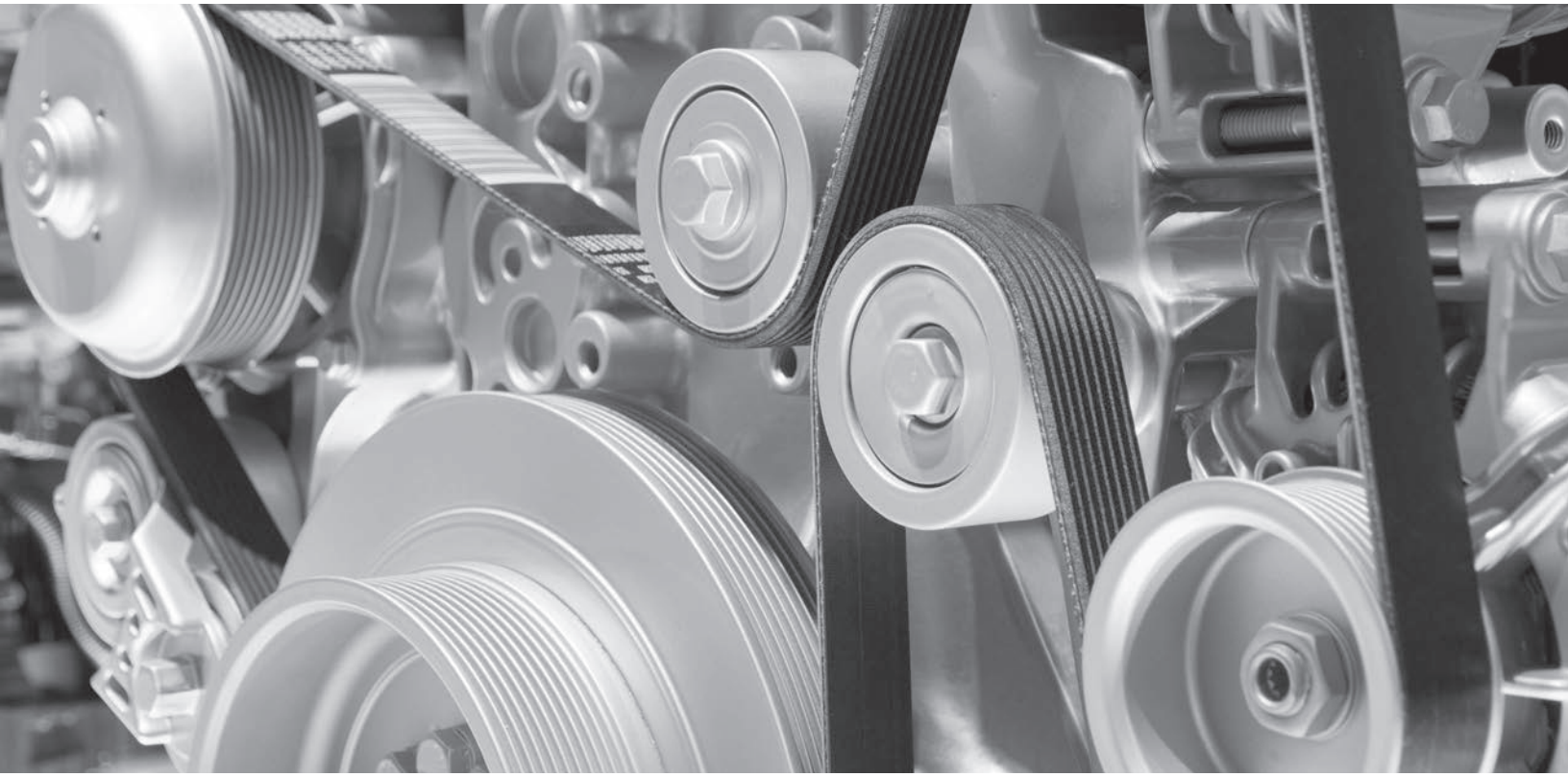
While these types of engines are different in size, shape, and output, they all still follow the same basic rotation and each of them runs on gasoline. However, a **diesel engine** uses a very different method of creating combustion.

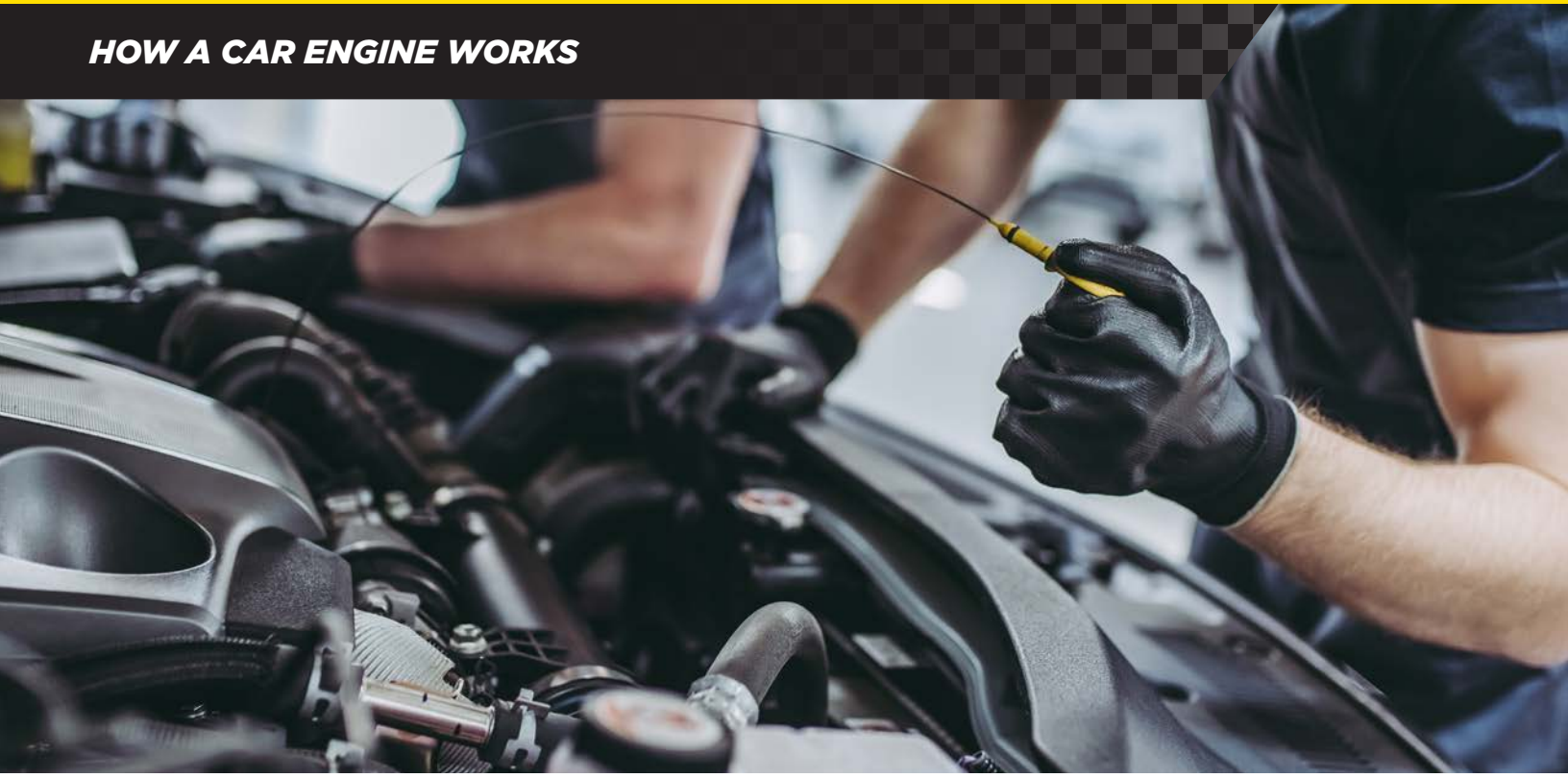
Diesel Engines

Named after its inventor, Rudolf Diesel, it's often credited with being a driving force behind the industrial revolution. While it was created for powering heavy machinery in factories, it was later scaled down and adopted as an alternate way to power motor vehicles.

There are two big differences between a gas and diesel engine. The first is that these engines run on specialty diesel fuel instead of gasoline. You've probably seen that it has its own separate pump at the gas station.

The second difference is that a diesel engine has no spark plugs. Instead, it relies on pressure and heat from the compression stroke to create the combustion. Since there is no spark to ignite the fuel and air mixture, a diesel engine needs its pistons to compress more. This creates more heat and energy which gives this type of engine more torque and also allows it to be more fuel-efficient than its gasoline powered counterparts.





Maintaining Your Engine

Your engine is constantly at work. With all those moving parts, a lot of heat builds while you're driving. Over time that heat can create friction and cause breakdowns. That's why it's so important to stay on top of your maintenance schedule.

Fluids like coolant and engine oil are used to keep the engine temperature cool and lubricate your parts so that they can operate smoothly. Getting your air filters replaced can help keep debris out of the engine block when your pistons are drawing air into the intake valves.

With regular trips to the service center for oil changes, coolant refills, and new air filters your engine will consistently deliver by giving you peak performance. Keeping up with routine maintenance is the best way to keep your engine clean and running well.

If you have any questions or would like to learn more about your car's engine, contact your local dealership today.