

# Four stroke cycle 41453



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From the time man set foot on earth, traveling short and long distances had been one of his basic needs. Horse-drawn carriages were used as means of travel and transportation in olden days. The ardent need to travel fast and save time gave rise to the invention of an auto-engine. The invention of a new auto-engine thus marked the dawn of the automotive era in the world. Most cars in Europe began to be built by hand in the early 1900s. As the auto-engine improved, the automobile industry also progressed rapidly.

Although a French engineer Alphonse Beau de Rochas had conceptualized a four-stroke cycle engine in 1862, it was the German engineer Nicolaus August Otto who first invented a complete four-stroke internal combustion engine in 1876 independently. The automobile was further powered by the invention of Otto gasoline engine by Karl Benz of Germany in 1885. This engine was considered more efficient on fuel and clean on burning than the two-stroke cycle engine. Ever since then it had been most commonly used in automobile vehicles like cars, vans and trucks, and in generators for the industrial purposes.

### The Scientific Principle & Types of Engines

Have you ever thought what happens when you turn the key in your car? What are the innards of your car engine and how do they work anyway?

An engine is the building block of a car. It is made up of several parts and each has its specific job to perform. First there are crankshafts whose job is to convert reciprocating motion to rotary motion, which causes the wheels to move. There are pistons, which are connected to the crankshaft. The pistons are connected to the crankshaft with a rod cap and the rod bolts.

The internal combustion engines are of different types and sizes, but they all use the same basic principle i. e. combustion of a fuel to produce energy. To give more definition to the principle on which the internal combustion engine works is that the combustion, which takes place in a confined space, produces expanding gasses, which in turn are used to generate power i. e. converting reciprocating motion into rotating motion. These internal combustion engines have been classified as reciprocating or rotary engines. In a reciprocating engine, the most common of the two, combustion takes place in a cylinder that has a piston that goes up and down, while a rotary engine has fewer parts and uses a disk based system. There are also spark ignition and compression ignition engines.

### Understanding the Four Stroke Cycle

The cycle in an Internal Combustion Engine most commonly used for automotive and industrial purposes is called the Four Stroke Cycle. In a piston engine this cycle is completed by the several movements (up and down) of the pistons. In a four-stroke engine, each piston moves 4 times (down, up, down, and up) to complete a cycle. The first down-stroke draws air into the cylinder. The first upstroke is the compression stroke. The second down-stroke is the power stroke. The second upstroke exhausts the gases produced by combustion. A four-stroke engine requires exhaust and air-intake valves. The Otto cycle is characterized by four strokes i. e. the back and forth straight movement of a piston inside a cylinder. These four strokes or steps, which a piston takes to complete one combustion cycle in a piston engine is called a four stroke cycle. These strokes are:

1. The Intake Stroke also called Induction Stroke
2. The Compression Stroke
3. The Combustion Stroke, also called Ignition, Power or Expansion Stroke
4. The Exhaust Stroke

The four-stroke cycle begins when the piston is positioned at the uppermost point. During the first intake (downward) stroke of the piston, a combustible mixture of fuel (gasoline) and air is drawn into the cylinder through the inlet valve. The inlet valve then closes. The second upward stroke compresses the fuel-air mixture, already present in the cylinder. This fuel-air mixture is then ignited usually by the spark plugs for a gasoline or Otto cycle engine at approximately the top of the compression stroke. The ignition (explosion) produces expansion in the burning gases that results in forcing the piston downward for the third stroke also called power stroke. The fourth and the final upward stroke, the Exhaust Stroke evacuates the burned or spent (exhaust) gases from the cylinder through the then-open exhaust valve, and finally thrown out in open air through the exhaust pipe. In a piston engine, each piston must move back and forth twice and stop four times to complete the cycle. A piston engine produces one power stroke every other time a piston moves down its cylinder.

#### Gasoline Engine Versus Diesel Engine

Another German engineer, Rudolph Diesel in 1892, invented the diesel engine. Diesel engine was designed chiefly for heavy-duty work. It is more powerful than gasoline engine and utilizes oil as fuel. Diesel engines are

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mostly used in heavy machinery, locomotives, ships, and typical automobiles like tractors, large buses, and huge freight trucks for heavy road-building equipment. There are two main types of diesel engines, the four-stroke engine and the two-stroke engine. These types differ according to the number of piston strokes required to complete a cycle of fresh-air intake, air compression, power, and exhaust.

However the Gasoline Engine differs with a Diesel Engine in so far as the ignition part is concerned. The diesel engine is a compression-ignition engine. It compresses the air in the cylinders, causing the temperature of the air to rise. Fuel injected into the hot, compressed air ignites explosively. Therefore the only aspect that makes the diesel engine differ from the gasoline engine is the different ignition cause in each which takes place at the top of compression stroke. In case of diesel engine the air-fuel mixture is ignited by the heat and pressure of the compressed gases, whereas they are ignited by a spark plug in a gasoline or Otto cycle engine.