ФГБОУ ВО ВОЛОГОДСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ

Институт культуры и туризма

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II ВСЕРОССИЙСКИЙ (С МЕЖДУНАРОДНЫМ УЧАСТИЕМ) КОНКУРС НАУЧНО-ТЕХНИЧЕСКОГО ПЕРЕВОДА

Английский язык

Технический текст

4-STROKE ENGINE

What is a 4-Stroke Engine, and How Does a 4-Stroke Engine Work?

A 4-stroke engine is a very common variation of an internal combustion engine. Most modern internal combustion-powered vehicles are 4-strokes, powered by either gasoline or diesel fuel.

During engine operation, pistons go through 4 events to achieve each power cycle. The definition of an event is an up or down piston motion. Upon completion of the 4 events, the cycle is complete and ready to begin again.

4-stroke engines deliver a good balance of power, reliability and efficiency. When it comes to emissions, 4-strokes separate each event mechanically, which reduces unburned fuel emissions. It also separates oil from fuel, which significantly reduces carbon monoxide emissions. This combination of desirable traits has earned the 4-stroke the top spot in passenger vehicles today.

What Are the Strokes of a 4-Cycle Engine?

In order to effectively power equipment, 4-stroke engines complete and repeat the following steps:

Intake stroke

- Piston moves down the cylinder bore from top dead center (TDC) to bottom dead center (BDC).
- Intake valve is open, the exhaust valve is closed.
- Downward piston motion creates a vacuum (negative air pressure) that draws that air/fuel mixture into the engine via the open intake valve.

Compression stroke

- Piston moves up the cylinder bore from bottom dead center to top dead center.
- Both the intake and exhaust valves are closed.
- Upward piston motion compresses air/fuel mixture in the combustion chamber .

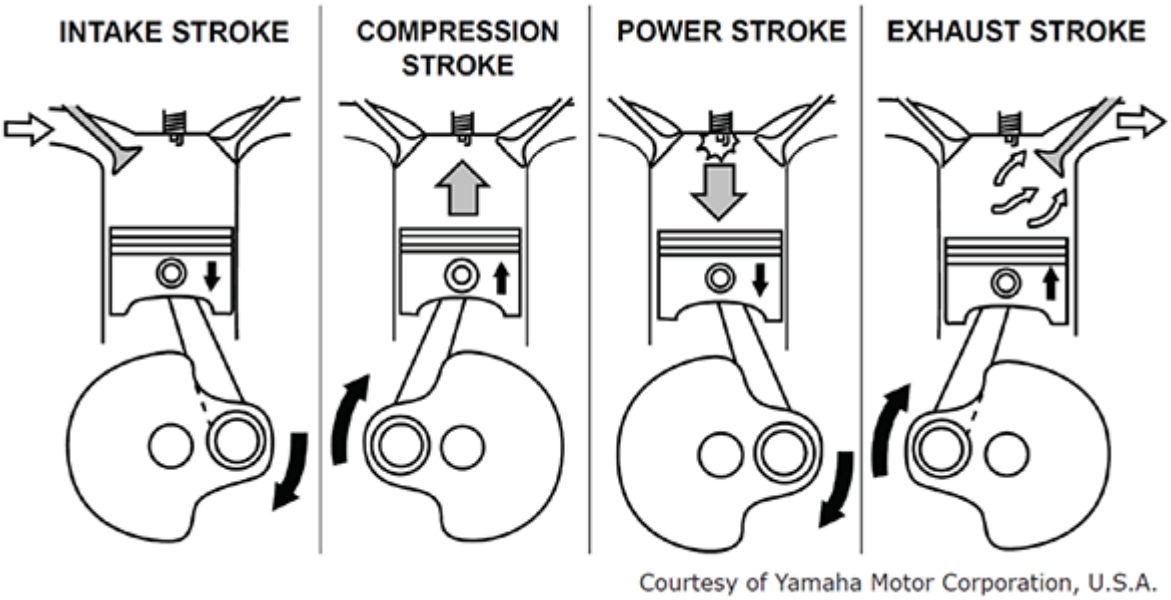
Power stroke

- At the end of the compression (previous) stroke, the spark plug fires and ignites the compressed air/fuel mixture. This ignition/explosion forces the piston back down the cylinder bore and rotates the crankshaft, propelling the vehicle forward.
- Piston moves down the cylinder bore from top dead center to bottom dead center.
- Both the intake and exhaust valve are closed.

Exhaust stroke

- Piston moves up the cylinder bore from bottom dead center to top dead center. The momentum caused by the power stroke is what continues the crankshaft movement and the other 3 strokes consecutively.
- Intake valve is closed, the exhaust valve is open.
- This final stroke forces the spent gasses/exhaust out of the cylinder. The cycle in now complete and the piston is ready to begin the intake stroke.

The below diagram gives a visual representation of how this process works:



Courtesy of Yamaha Motor Corporation, U.S.A.

1. **Intake stroke**: The intake valve (on the top left of each image) is open and as the piston travels downward, this suction pulls the air/fuel mixture into the cylinder.
2. **Compression stroke**: Both valves are now closed and the piston compresses the air fuel into a much smaller volume, preparing the mixture for ignition.
3. **Power stroke**: With both valves closed, the spark plug—located in the picture between the intake and exhaust valve will fire, igniting the air/fuel mixture. The resulting explosion forces the piston downward and rotates the crankshaft, which in turn propels the vehicle.
4. **Exhaust stroke**: The exhaust valve (on the top right of each image) is now open, allowing the piston to push the spent exhaust gasses out of the engine as it rises. The 4-strokes (1 engine cycle) are now complete, and the process repeats.

   Air is compressible. When the air/fuel is compressed before ignition, combustion efficiencies are improved. Compression ratio is the relationship of total cylinder volume to compressed volume. For example, a compression ratio of 10:1 (verbally spoken as “10 to 1”) would indicate that the chamber squeezes 10 parts of air/fuel volume into 1 part of that volume at the end of the compression stroke.