

Reciprocating engine

A **reciprocating engine** is an engine that uses one or more **pistons** in order to convert **pressure** into rotational motion. They use the reciprocating (up-and-down) motion of the pistons to translate this energy.^[1] There are many different types, including the **internal combustion engine** which is used in most motor vehicles, the Steam engine which is a type of **external combustion engine**, and the **Stirling engine**. These engines share common characteristics but vary extremely differently in their functioning, providing many different advantages and disadvantages.

How it works

All types have one or more pistons, which follow the four-stroke cycle visible in Figure 1. Common **engine block** configurations include a single row of cylinders (in-line), two rows converging to a point (V-engine), a double zigzag (W-engine) and two horizontal rows (opposed engine).^[1] The engines mentioned above (internal combustion, steam, Stirling) all use somewhat different processes to complete the cycle, so the general case will be explored.

1. To begin the cycle, a fuel mixture is introduced inside the cylinder through the intake port, expanding the piston to the bottom of the cylinder.
2. The piston then gets pushed to the top, compressing the fuel mixture and igniting it via the **spark plug**.
3. The **ignition** pushes the piston downwards providing useful work to the engine.
4. The waste **chemicals** get output through the exhaust port and the cycle repeats.

This process can be seen in Figure 2.

- **Reciprocating Engine**

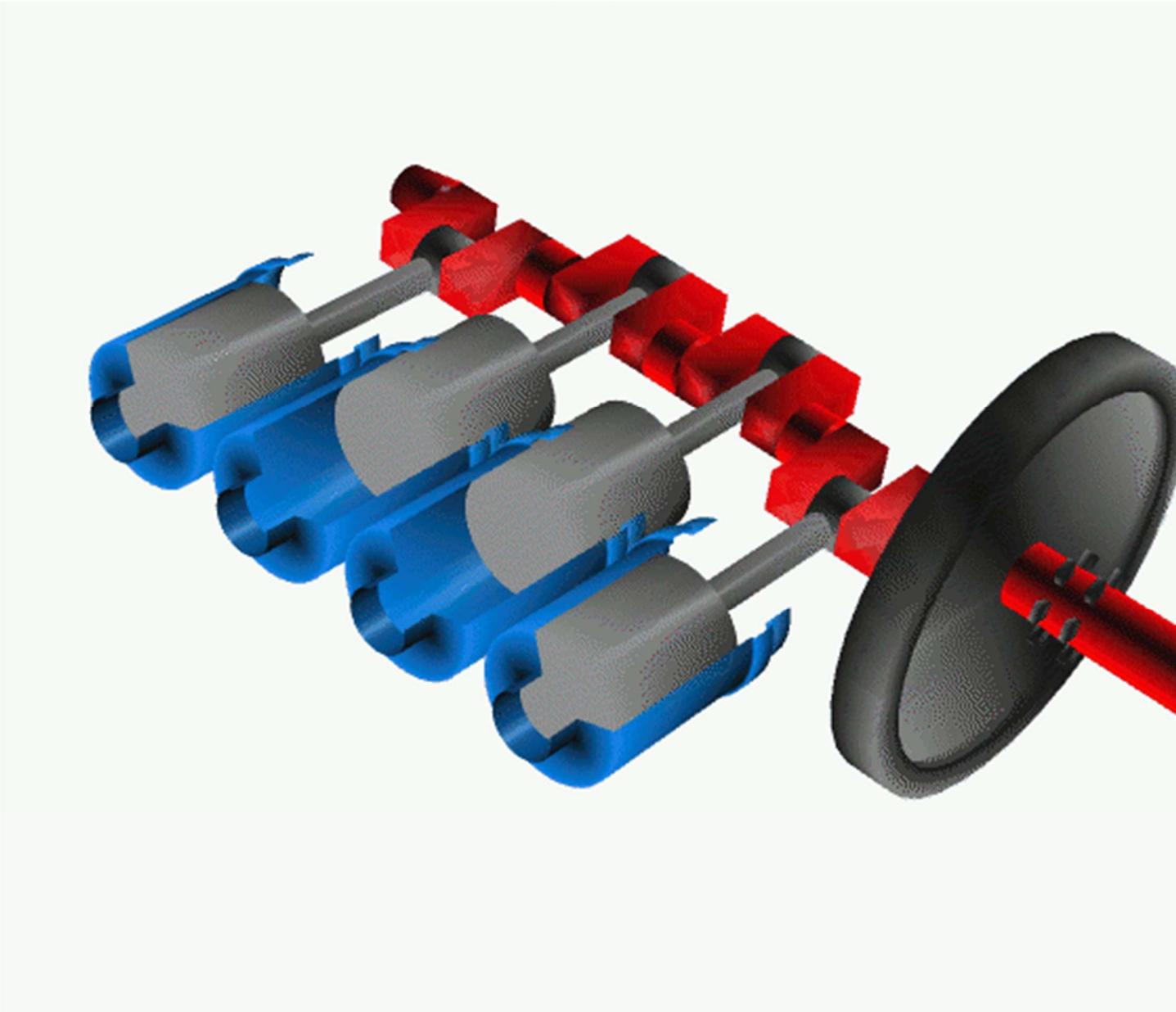


Figure 1: The crankshaft (red) converts reciprocating motion from the pistons (grey) which is often combined with a flywheel (black).^[2]

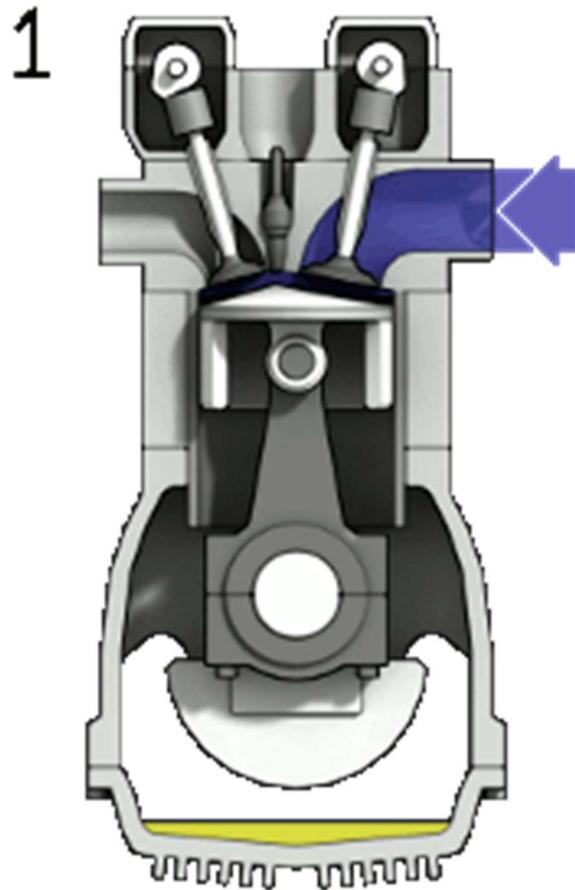


Figure 2: 4-stroke internal combustion engine. 1: fuel injection, 2: ignition, 3: expansion (work is done), 4: exhaust.^[3]

The four-stroke cycle is what gives the engine its energy, but now it must translate this energy into **rotational energy** for the **transmission**, **drive shaft** and wheels. This is done by the **crankshaft**, which is seen in Figure 1. The crankshaft converts this up-and-down motion into rotational motion, which is often combined with a flywheel to retain the discontinuous reciprocating energy as rotational energy.

TRUE OR FALSE?

- 1- A rotary engine uses pistons to convert the up and down motion into rotational motion T / F
- 2- The internal combustion engine is a type of reciprocating engine T / F
- 3- The name of the letters used for engines indicates their shape T / F
- 4- The fuel mixture that enters through the intake port pushes down the piston T / F
- 5- In the compression stroke the piston pushes the fuel upwards to be ignited by the spark plugs T / F
- 6- The exhaust pipe is the valve that expels the exhaust gases in the exhaust stroke T / F
- 7- The drive shaft transfer the rotational motion to the wheels T / F
- 8- The Italian translation of “crankshaft” is “albero di trasmissione” T / F

Match each engine with its name

A) Opposed engine	 <p style="text-align: right;">1</p>
B) In-line engine	 <p style="text-align: center;">2</p>
C) V engine	 <p style="text-align: right;">3</p>
D) W engine	 <p style="text-align: right;">4</p>