How a Motorcycle Engine Works: The Four-Stroke Cycle

A motorcycle engine is an **Internal Combustion (IC)** engine, meaning the fuel is burned inside the engine itself. The engine's core purpose is to convert the up-and-down (reciprocating) motion of a piston into the circular (rotational) motion of a crankshaft, which ultimately powers the wheels.

Core Components

The engine block contains the essential parts that work together to create power. The main components are housed within the **Cylinder**, the sealed chamber where combustion occurs. A **Piston** moves up and down inside this cylinder, connected to the **Crankshaft** by a **Connecting Rod** to translate linear motion into rotation. The engine uses **Valves** (Intake and Exhaust) to control the flow of the air-fuel mixture *into* and the burnt gases *out of* the cylinder, and a **Spark Plug** to deliver the electric current needed for ignition.

The Four Strokes of Power

The engine completes one power cycle in four distinct strokes of the piston, requiring two full rotations of the crankshaft. Only one of these four strokes—the Power stroke—actually generates force.

1. Intake Stroke (Suck)

The cycle begins when the piston moves **downward** from Top Dead Center (TDC).

- The **Intake Valve** opens.
- The piston’s downward motion creates a vacuum, drawing a precise mixture of air and fuel into the cylinder.
- The **Exhaust Valve** remains closed.

2. Compression Stroke (Squeeze)

After reaching the bottom (Bottom Dead Center or BDC), the piston moves **upward**.

- Both the **Intake and Exhaust Valves** close, sealing the combustion chamber.
- The upward-moving piston rapidly compresses the air-fuel mixture, making it extremely dense and raising its temperature. This compression is necessary for a powerful ignition.

3. Power Stroke (Bang)

Just as the piston nears TDC, ignition occurs.

- The **Spark Plug** fires, igniting the highly compressed air-fuel mixture.
- The resulting, controlled explosion creates a rapid expansion of hot gases.
- This intense pressure forces the piston violently **downward**, providing the mechanical force that turns the crankshaft. This is the stroke that generates power.

4. Exhaust Stroke (Blow)

The piston moves **upward** for the final time in the cycle.

- The **Exhaust Valve** opens.
- The upward motion of the piston pushes the spent, burnt gases out of the cylinder and into the exhaust system.
- The **Intake Valve** remains closed.

Once the piston reaches TDC again, the Exhaust Valve closes, the Intake Valve opens, and the entire four-stroke cycle immediately begins anew, repeating thousands of times per minute to keep the motorcycle running.

The single power stroke provides enough rotational momentum, stored in a component called the flywheel, to carry the piston through the three non-power strokes (Intake, Compression, and Exhaust) until the next power stroke occurs.