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TWO STROKE AND FOUR STROKE ENGINES, WORKING PRINCIPLES



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Heat engine is a machine for converting heat, developed by burning fuel into useful work.

It can be said that heat engine is equipment which generates thermal energy and transforms it into mechanical energy.

CLASSIFICATION OF HEAT ENGINES

1. Based on combustion of fuel:

- (i) External combustion engine
- (ii) Internal combustion engine.



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Internal combustion engine

In internal combustion engine, the combustion of fuel takes place inside the engine cylinder and heat is generated within the cylinder.

This heat is added to the air inside the cylinder and thus the pressure of the air is increased tremendously.

This high pressure air moves the piston which rotates the crank shaft and thus mechanical work is done



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External Combustion Engine

An **external combustion engine** (EC engine) is a heat engine where an (internal) working fluid is heated by combustion in an external source, through the engine wall or a heat exchanger. The fluid then, by expanding and acting on the mechanism of the engine, produces motion and usable work. The fluid is then cooled, compressed and reused (closed cycle), or (less commonly) dumped, and cool fluid pulled in (open cycle air engine).



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2 Stroke Spark Ignition Engine

A **two-stroke engine** is an internal combustion engine that completes the process cycle in one revolution of the crankshaft (an up stroke and a down stroke of the piston, compared to twice that number for a four-stroke engine).

This is accomplished by using the end of the combustion stroke and the beginning of the compression stroke to perform simultaneously the intake and exhaust (or scavenging) functions.



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4 Stroke Spark Ignition Engine

A four-stroke engine, also known as **four-cycle**, is an internal combustion engine in which the piston completes four separate strokes—intake, compression, power, and exhaust—during two separate revolutions of the engine's crankshaft, and one single thermodynamic cycle.



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Working Principle of 4 Stroke Spark Ignition Engine

INTAKE STROKE: on the *intake* or *induction* stroke of the piston, the piston descends from the top of the cylinder to the bottom of the cylinder, reducing the pressure inside the cylinder. Air is forced by atmospheric (or greater) pressure into the cylinder through the intake port. The intake valve(s) then close.

COMPRESSION STROKE: with both intake and exhaust valves closed, the piston returns to the top of the cylinder compressing the air, or fuel-air mixture into the combustion chamber of the cylinder head.



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POWER STROKE: This is the start of the second revolution of the engine. While the piston is close to Top Dead Center, the compressed air–fuel mixture in a gasoline engine is ignited, usually by a spark plug, or fuel is injected into the diesel engine, which ignites due to the heat generated in the air during the compression stroke. The resulting massive pressure from the combustion of the compressed fuel-air mixture forces the piston back down toward bottom dead centre.



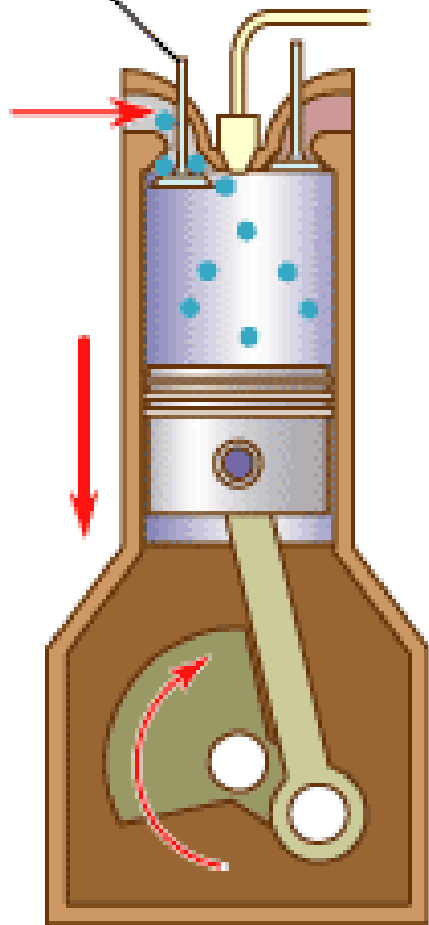
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EXHAUST STROKE: during the *exhaust* stroke, the piston once again returns to top dead center while the exhaust valve is open. This action evacuates the burnt products of combustion from the cylinder by expelling the spent fuel-air mixture out through the exhaust valve(s).

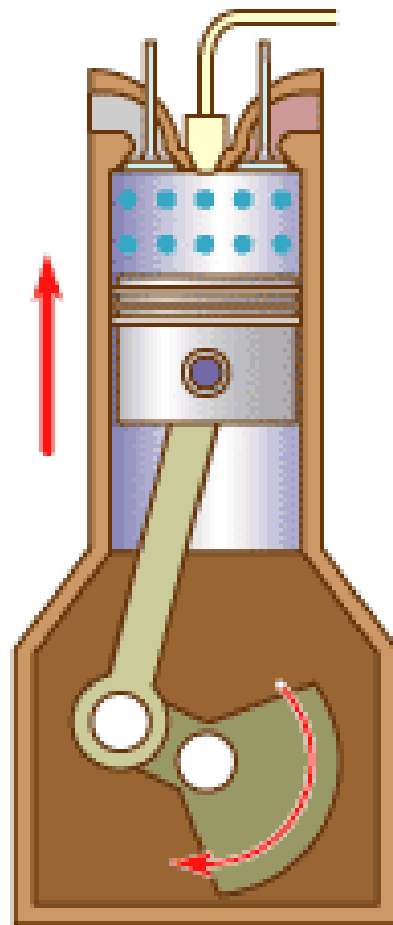


intake valve



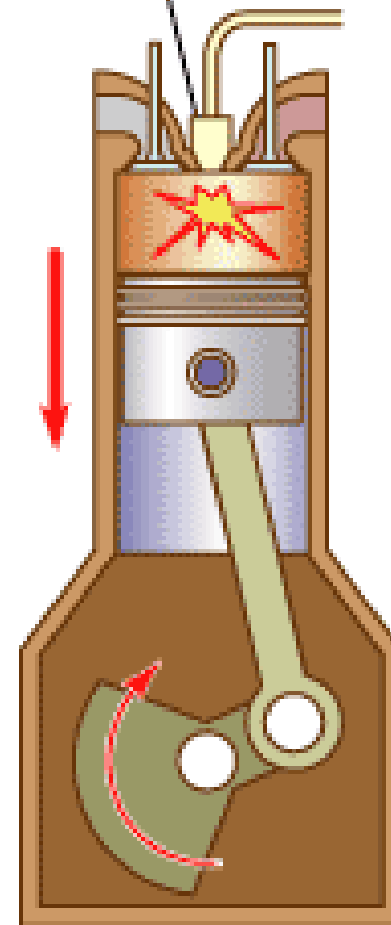
intake

fuel injector

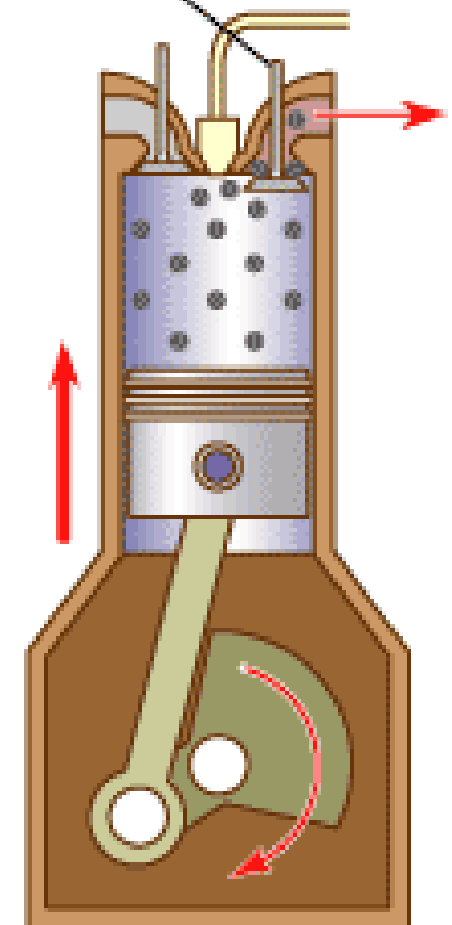


compression

exhaust valve



power



exhaust