

# SPARK PLUG



A spark plug (sometimes in British English<sup>[[1]]</sup>, a sparking plug) is an electrical device that fits into the cylinder head of some internal combustion engines and ignites compressed Particulate<sup>[[2]]</sup>aerosol gasoline<sup>[[3]]</sup> by means of an electric spark.

## **System connection**

Spark plug insulated center electrode is connected by a heavily insulated wire to an ignition coil or magneto circuit, mounted external to the engine. The spark plug body forms a grounded terminal on the base of the plug on the cylinder head, with a spark gap inside the cylinder. Early patents for spark plugs included those by Nikola Tesla <sup>[[4]]</sup> (in US patent 609,250 for an ignition timing system, 1898), Richard

Simms (GB 24859/1898, 1898), and Robert Bosch (GB 26907/1898). Karl Benz [[5]] is also credited with the invention.

### **Combustion inside cylinder**

Internal combustion engines can be divided into spark-ignition engines, which require spark plugs to begin combustion, and compression-ignition engines (diesel engines), which compress the fuel/air mixture until it spontaneously ignites. Compression-ignition engines may use glow plugs to improve cold start characteristics.

### **Uses**

Spark plugs are a must in spark-ignition engines. It may also be used in other applications such as furnaces where a combustible mixture should be ignited. In this case, they are sometimes referred to as flame igniters.

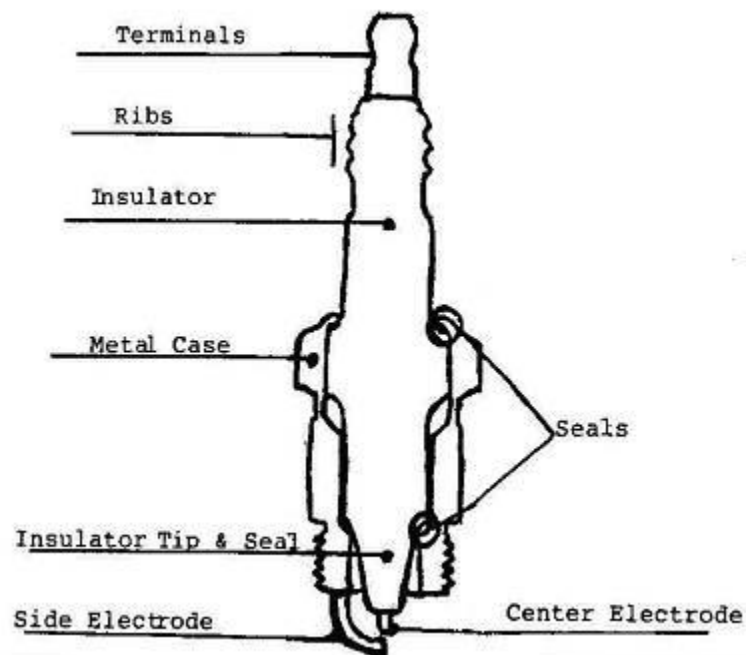
### **How it operates**

The spark plug is connected to thousands of volts generated by the ignition coil. As the electrons are gradually stressed in from the coil, a voltage difference appears between the live center electrode and grounded side electrode or body. No current can flow between these because the fuel air mixture in the gap is an insulator. As the voltage rises further, it begins to change the structure of the gases between the electrodes. Once the voltage exceeds the dielectric strength [[6]] of the gases, the gases become ionized [[7]]. An ionized gas becomes a conductor and an ionized gas can pass electrons.

As the current of electrons surges across the gap, it raises the temperature of the spark channel to 60,000 K. The intense heat in the spark channel causes the ionized gas to expand very quickly, like a small explosion. This is the "click" you hear when watching a spark, similar to lightning[[8]] and thunder[[9]].

The heat and pressure force the gasses to react with each other and at the end of the spark event there should be a small ball of fire in the spark gap as the gases burn on their own. The size of this fireball or kernel depends on the exact composition of the mixture between the electrodes and the level of combustion chamber turbulence at the time of the spark. A small kernel will make the engine run as though the ignition timing was retarded and a large one like the timing was advanced for that individual cycle.

### Spark plug construction



A spark plug is composed of a shell, insulator and the conductor. It pierces the wall of the combustion chamber and therefore must also seal the combustion chamber against high pressures and temperatures, without deteriorating over long periods of time and extended use.

Source : [http://engineering.wikia.com/wiki/Spark\\_plug](http://engineering.wikia.com/wiki/Spark_plug)