



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35.



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DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB204 – AUTOMOTIVE ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR / IV SEMESTER

Unit 2 – Starting and Ignition System

Topic : Spark Plug



SPARK PLUG



- ❖ A spark plug is a crucial component in an internal combustion engine.
- ❖ It's responsible for igniting the air-fuel mixture in the engine's combustion chamber, creating the controlled explosion that powers the engine.
- ❖ There are different types of spark plugs, including copper-core, platinum-tipped, and iridium-tipped plugs
- ❖ There are two types of spark plug depending upon the heat dissipation namely Hot spark plug, Cold spark plug.





HOT SPARK PLUG



- ❖ Hot plugs have a shorter insulator nose and are designed to retain more heat within the combustion chamber.
- ❖ They are typically used in engines that operate at lower temperatures or have a tendency to foul due to short-distance driving or low-speed operation.
- ❖ Hot plugs are more resistant to fouling because they stay at a higher temperature, which helps burn off deposits such as carbon.
- ❖ However, in high-performance engines or engines that operate under heavy loads or at high speeds, hot plugs may lead to pre-ignition issues, as they can contribute to elevated combustion chamber temperatures.



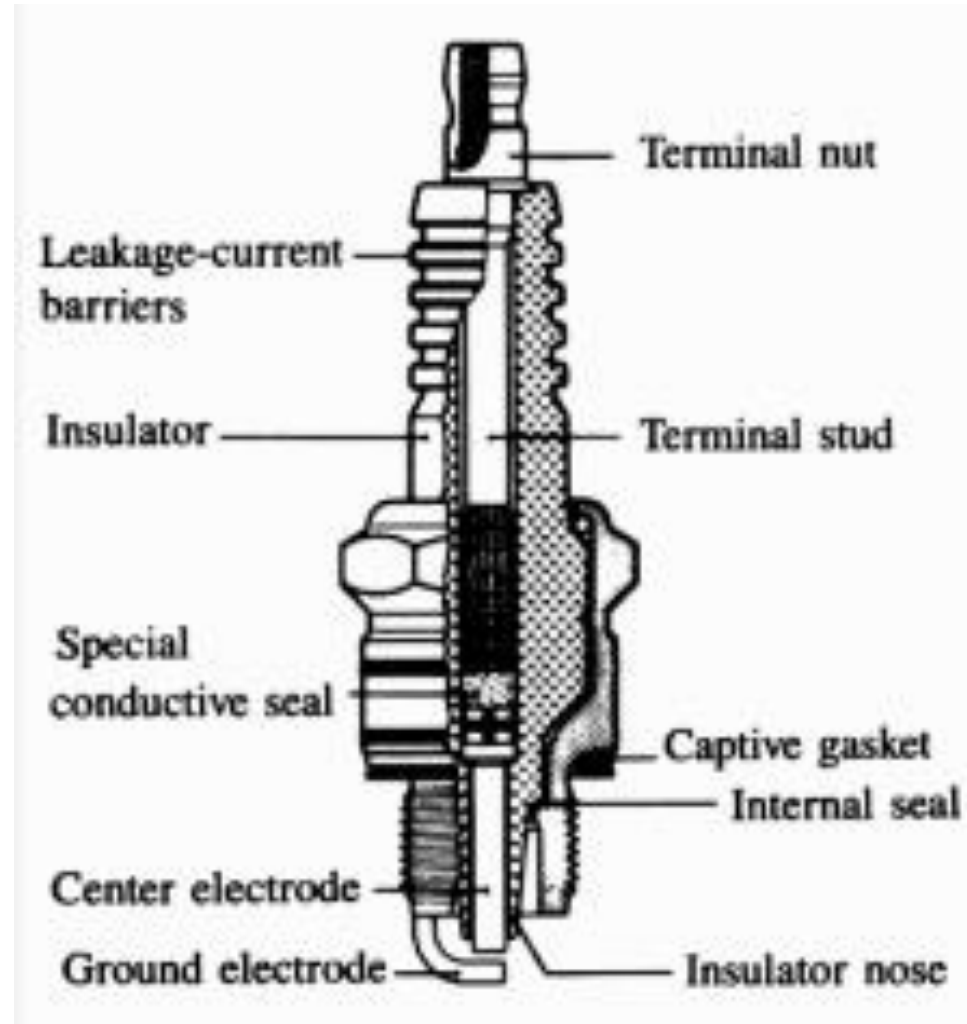
COLD SPARK PLUG



- ❖ Cold plugs have a longer insulator nose and are designed to dissipate heat more effectively from the combustion chamber.
- ❖ They are commonly used in high-performance engines or engines that operate under heavy loads, high speeds, or in hot climates.
- ❖ Cold plugs help prevent pre-ignition by keeping the combustion chamber temperature lower, reducing the risk of detonation.
- ❖ However, in engines that primarily operate at low speeds or in cold climates, cold plugs may foul more quickly because they may not reach a high enough temperature to burn off deposits efficiently.



COMPONENTS OF SPARK PLUG





COMPONENTS OF SPARK PLUG



- ❖ **Shell:** The shell of the spark plug serves as the outer casing that houses the internal components. It is usually made of steel or other durable materials to withstand the high temperatures and pressures within the engine.
- ❖ **Insulator:** The insulator is a ceramic material that separates the central electrode from the shell. It provides electrical insulation, preventing the electric current from traveling down the spark plug's body and instead directing it to the electrode gap.



COMPONENTS OF SPARK PLUG



- ❖ **Central Electrode:** The central electrode extends into the combustion chamber and protrudes from the insulator into the gap between the central electrode and the ground electrode. It conducts electricity from the ignition coil to produce the spark that ignites the air-fuel mixture.
- ❖ **Ground Electrode:** The ground electrode is mounted parallel to the central electrode, and together they form the spark gap. When the electric current jumps across this gap, it creates the spark necessary for combustion. The ground electrode also helps dissipate heat generated during the ignition process.



COMPONENTS OF SPARK PLUG



- ❖ **Spark Gap:** The spark gap is the space between the central electrode and the ground electrode where the electric spark occurs. The size of this gap is critical for proper spark plug operation and is typically determined by the manufacturer based on the engine's specifications.
- ❖ **Terminal:** The terminal is the connection point for the spark plug wire or ignition coil. It provides the electrical connection between the ignition system and the spark plug, allowing the electric current to flow to the central electrode.



WORKING OF SPARK PLUG



- ❖ When the ignition system is activated, it sends a high-voltage electrical current from the ignition coil or magneto to the spark plug.
- ❖ The electrical current flows through the central electrode of the spark plug.
- ❖ The insulator, made of ceramic material, acts as an electrical insulator, preventing the current from flowing to the grounded metal shell of the spark plug.
- ❖ As the electrical current reaches the gap between the central electrode and the ground electrode, the voltage across the gap increases.
- ❖ When the voltage reaches a critical point, typically around 5,000 to 25,000 volts depending on the engine and spark plug type, it ionizes the air and fuel mixture between the electrodes.



WORKING OF SPARK PLUG



- ❖ The ionization of the air-fuel mixture creates a conductive plasma channel between the electrodes.
- ❖ This plasma channel provides a path of low electrical resistance for the current to flow.
- ❖ Once the plasma channel is established, the electrical resistance decreases dramatically, allowing a surge of current to flow across the gap almost instantaneously.



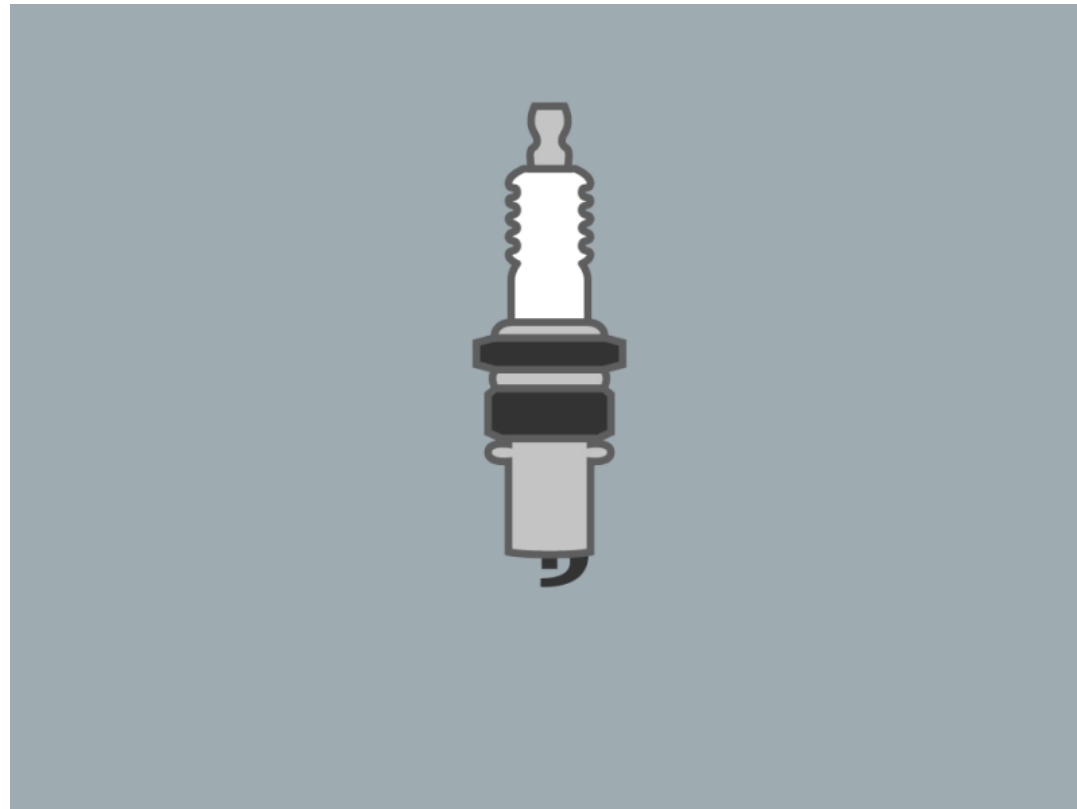
WORKING OF SPARK PLUG



- ❖ This surge of current generates intense heat, causing the air-fuel mixture to ignite and initiate combustion.
- ❖ The ignition of the air-fuel mixture results in a rapid expansion of gases, creating the combustion process that drives the engine.
- ❖ After ignition, the spark plug returns to its original state, ready for the next cycle of operation.



SPARK PLUG





THANK YOU !!!