



Spark Plug Design

Every year the range of NGK spark plugs grows to accommodate the ever increasing demands of modern engines. Spark plug design must take into consideration many features of an engine including physical dimensions, combustion chamber shape, cooling abilities, fuel and ignition systems. Spark plugs play a vital role in producing the maximum power from an engine whilst keeping fuel consumption and emissions to a minimum. Choosing the correct spark plug type will help a vehicle manufacturer meet legislated emission targets and assists the motorist in getting the best from his engine.

Increases in the size and the requirement to improve the cooling of the inlet and exhaust valves have meant that the space available for the spark plug is severely restricted on some cylinder heads.

A change in spark plug design, possibly the adoption of a taper seat and extended reach (threaded portion) or even the use of a smaller diameter is often the answer. Some engines require the use of two spark plugs per cylinder and again due to space restrictions these might be of different sizes.

Changes in fuelling systems and the fuel itself have meant some special features being adopted at the 'firing end' of the spark plug. Extra projected types push the spark position into the heart of the combustion chamber to promote better combustion of the fuel/air mixture, which is weaker than ever in an effort to improve economy. Modern engines manufacturers often require increased spark gaps to allow a longer spark duration, which again aids more efficient combustion.

To Combat the 'cold fouling' effect that can occur in some engines using



unleaded fuels specially arranged ground electrodes are sometimes used. These can force the spark to discharge across

the insulator and thus burn away any built up carbon that could cause poor starting or misfires. It is not uncommon to find two, three or four ground electrode arrangements in new vehicles. The use of precious metals on the tips of the spark plug electrodes is not uncommon especially on higher performance cars. Whilst these spark plugs do have increased service life they are often specified because of their superior ignition qualities.

NGK's engineering departments work very closely with the engine and vehicle manufacturers to produce the ideal spark plug type for each application. Any change in production is expensive for a manufacturer and therefore new spark plug types are only produced where necessary. NGK employ the very latest production technology to ensure that every aspect is catered for - performance, economy and value.

Heat Range and Heat Dissipation

Spark plugs do not produce heat in the combustion chamber. One of the functions of the spark plug is to dissipate some of the heat produced during combustion. This is mostly transferred into the cylinder head. The 'Heat Range' indicates the measure of the spark plug's ability to do this. A 'hot' spark plug is designed to maintain a sufficiently high temperature at the insulator nose to burn off carbon and oil deposits. A 'cold' spark plug is designed to allow a faster transfer of heat to the cylinder thus preventing overheating and premature failure.

The heat range selection is obviously a complex task with many factors to take into account. NGK engineers therefore make specific recommendations for each engine and the use to which it is put.

Wide Heat Range

A wide range spark plug is more flexible and performs equally well in a hot or cold engine under stop and go city driving or fast motorway cruising. Engines that tend to run hot need cold type plugs. Those that run cold demand a hotter type. The specific plug for any engine is determined by the plug's heat range. That is the minimum and maximum temperatures between which the plug will offer optimum performance.

The heat range of NGK Spark Plugs is wider than ordinary plugs therefore



they are suitable for both high speed and low speed driving. Compared with conventional plugs of the same pre-ignition rating they have more resistance to fouling. Compared to ordinary plugs with equal anti-fouling resistance, NGK Spark Plugs have a higher pre-ignition rating.

NGK's Heart Of Copper

Copper wire used in place of the iron core in conventional plugs is the secret of NGK's Wide Heat Range. Copper's superior heat conductivity dissipates heat quicker. It cools the electrode tip and insulator tip which prevents hot spots that could cause pre-ignition. Increased heat resistance does not affect fouling resistance, which is primarily determined by the insulator nose length. The longer the nose, the more susceptible it is to heat and the more free from fouling. By raising the pre-ignition rating with the high conduction copper and leaving the insulator nose long, NGK produces the Wide Range Plug. One that meets the broad thermal requirements of engines under high and low RPM conditions.

NGK Iridium IX®

The Spark Plug Serious Enthusiasts Rely On Iridium IX Spark Plugs are the most technologically advanced high performance plugs available. Featuring a 0.6 mm iridium centre electrode tip, they offer superior ignitability without sacrificing durability. The tapered ground electrode increases flame kernel expansion, while the superior heat range design is ideally suited to the demands of high performance environments. Specially designed to meet the needs of serious enthusiasts, Iridium IX Spark Plugs offer outstanding acceleration, high fuel efficiency and long life. When you demand the most from your engine, rely on the proven performance of NGK Iridium IX Spark Plugs. NGK's new Iridium IX is the personification of these qualities and takes premium performance spark plugs to a new level. A level that is expected from the world leader in spark plugs.

Iridium is a precious, silver-white metal and one of the densest materials found on earth. The natural properties of Iridium offered NGK the opportunity to create one of the world's finest spark plugs. The result are spark plugs that require less voltage to spark, burns fuel more efficiently, sparks at leaner air/fuel mixtures, and delivers higher horsepower and better gas mileage. It may be time to invest in precious metal futures. NGK Iridium Spark Plugs represent the ultimate evolution of spark plug technology and performance. Iridium allows for a centre electrode 75 percent the size of a platinum electrode and 24 percent the size of a conventional nickel electrode. The fine electrode tip is engineered for



greater ignitability. And it's in the design of the iridium tip that makes Iridium IX a better spark plug. The electrode is not too thin and not too thick. It's just the right size to reduce the voltage required for spark and to maximise the overall longer life qualities of iridium

