The Technology

In order to reach future allowable emission levels, automotive engines have to be operated using lean air/fuel mixtures. These gas mixtures are extremely difficult to ignite with conventional ignition systems. Misfires are common, which results in lost performance and rough engine operation.

Omnitek Engineering, Corp. has developed a novel approach to the challenge at hand. The technology offers a level of confidence when building a lean-burn engine that can only be offered by other more complicated and expensive technologies, but yet these technologies only marginally approach our capabilities.

The technology applies capacitor technology, not unlike as used in a photo flash. There, the power from a 1.5 Volt battery is transformed into a blinding flash of light, much brighter than can be expected by a flashlight that uses the same 1.5 Volt battery, but uses the battery power directly without first "charging" a capacitor.

The Omnitek capacitor is located very close to the spark plug in parallel to the secondary side, (high voltage side) of the ignition system. This capacitor stores and "condenses" the spark until the ionization voltage at the spark plug electrodes is reached. At this time the capacitor discharges all the stored energy across the spark plug gap forming a high intensity spark or plasma.

The resulting much enlarged, high-heat flame-kernel supports the creation of a very fast flame-front. This fast flame-front inhibits knocking by assuring that all the mixture in the combustion chamber is ignited by controlled means before a second or third flame-front can develop and cause engine knock through colliding flame-fronts.

It has been shown that the capacitor technology increases combustion temperature and pressure, while substantially decreasing cycle-to-cycle variation caused by repeated lean-misfire. It was further recorded that the exhaust temperature was lower, because the combustion energy was used more efficiently. Peak cylinder pressure was reached 3 degrees sooner. By adjusting the valve and ignition timing to the new engine parameters, rather than treating our technology as a bolt-on no-adjustments-needed technology, all emissions can be substantially reduced while power is maintained. The very precise, short-duration spark results in a very efficient engine. Or to quote a supporter of the technology, "The effect of the design is accelerated flame front propagation, resulting in intensive, rapid, and highly efficient combustion to generate high (cylinder) pressure and high output".

There is no other technology that can affect the combustion process in just the same way as a precise short-duration high-power spark can. The formula for power is work/time. Shortening the discharge time of a given amount of spark power, (whatever the coil can supply) will increase spark power, (Ampere, Watts, Kelvin). It is contrary to logic to assume that a long duration spark that releases a given amount of energy over 20 to 120 degrees of crankshaft rotation, (depending on RPM), is beneficial to combustion. If the air/fuel mixture is not ignited shortly after the optimum ignition timing point, spark energy goes unused to waste. With a short-duration spark, all the available spark energy is discharged at once, assuring combustion initiation and fast flame-front propagation.