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PLASMA POWERED

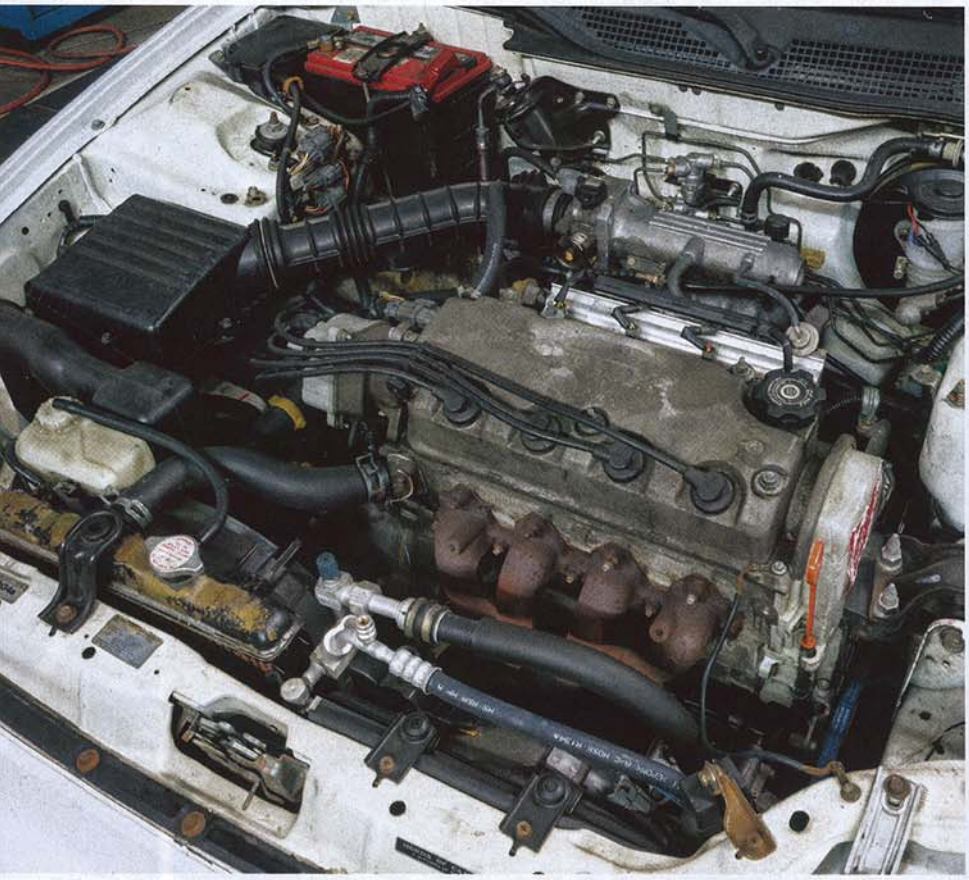
Changing the State of Spark Plugs

Text and Photos by Sami Sharaf

HUMAN COGNITION IS A MIND-BLOWING phenomenon that's capable of incredible processes like abstract thinking, high-level computation and lightning-fast heuristics. Even though the list of amazingly complex procedures the human brain can process is long, there are still simple things that are completely incomprehensible. The dollar figure of the national debt, the space of our solar system or the amount of energy in an internal combustion engine are just a couple examples of concepts that are extremely difficult to wrap your head around.

WHEN ENERPULSE CREATED A SIMPLE METHOD TO INCREASE FUEL ECONOMY BY OPTIMIZING COMBUSTION EFFICIENCY, THEY ALSO REALIZED THAT ADDITIONAL PERFORMANCE COULD BE EXTRACTED WITH THE SAME TECHNOLOGY.

Unlike traditional spark plugs, the Pulstar with PlasmaCore spark plug is said to release a much greater spark energy into the combustion chamber.



THIS ALLOWS FOR A SPARK WITH AN INCOMPREHENSIBLE PEAK POWER OF UP TO 5 MEGAWATTS. TO PUT THIS IN PERSPECTIVE, 1 MEGAWATT CAN POWER UP TO 1,000 HOUSES.

Each Pulstar spark plug features a high-purity ceramic insulator which is engineered to store spark energy before moving on to ignite the air-fuel mixture in the combustion chamber of the engine.

The engineers at Enerpulse Technologies have put their cognitive abilities to the test for many years in trying to enhance the efficiency of the internal combustion engine. During this time, the company has delved into the research and development of ignition solutions for both the OEM and aftermarket segments. As a dual benefit, advancements in one segment have led to progress in the other. When Enerpulse created a simple method to increase fuel economy by optimizing combustion efficiency, they also realized that additional performance could be achieved with the same technology.

No Status Quo

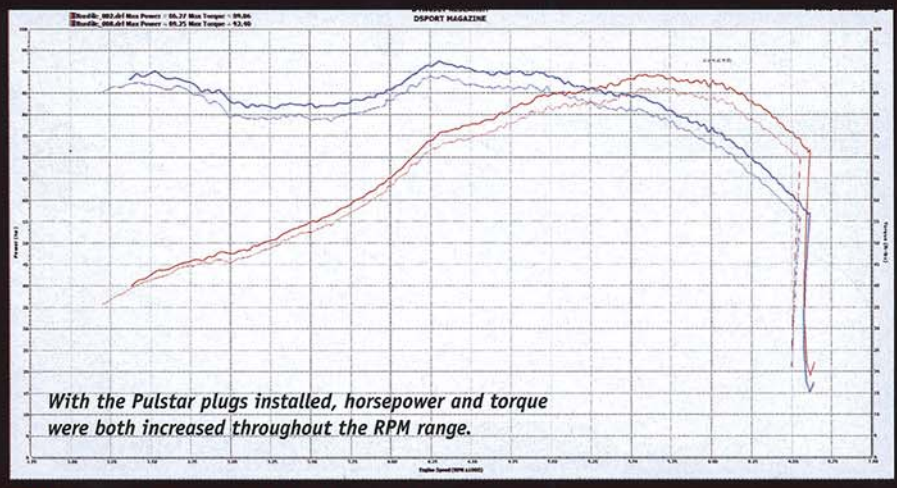
Instead of redesigning the entire engine or ignition system of an engine, Enerpulse looked to enhance just one component that could optimize the spark energy output of the ignition system. That one part was the spark plug. Traditionally, spark plugs receive voltage until a threshold is met that bridges the spark plug's electrode and ground strap. At this point, an electric spark is created which ignites the air-fuel mixture and initiates the power stroke of the internal combustion engine. This is the same way spark plugs have been designed for over 100 years.

Plasma Power

The Pulstar with PlasmaCore spark plug by Enerpulse features a high-purity ceramic capacitor that stores energy until it is ready to spark. In this configuration, a Pulstar spark plug can deliver greater and larger spark energy than a conventional spark plug. According to Pulstar, this allows for a spark with an incomprehensible peak power of up to 5 megawatts. To put this in perspective, 1 megawatt can power up to 1,000 houses. This is an incredible amount of energy that is said to break apart the gaseous atoms of the air-fuel mixture into a plasma state which results in a more instantaneous ignition, leading to a quicker and more complete burn. In theory, this method of combustion should result not only in increased efficiency in the ignition and fuel systems but also make way for more power to be generated during the power stroke.

Out with the Old

To test the Pulstar with PlasmaCore spark plugs, we chose a completely stock 1993 Honda Civic for our test platform. Before beginning the test, we replaced the factory spark plugs with a fresh set then strapped the car onto our Dynojet 424xLC2 Linx dynamometer. We established baseline power figures clocking in at 86.27 wheel horsepower at 5,600 RPM and 89.06 lb-ft of torque at 4,300 RPM. Once the car cooled down, we removed the OE-spec plugs and replaced them with a set of Pulstar PlasmaCore plugs (part # BE1H10). The installation of the Pulstar plugs did not differ in any way from the installation of the OE-spec plugs. In fact, the plugs we removed and replaced both used the same spark plug socket making the removal and replacement a simple and quick affair.



With the Pulstar plugs installed, horsepower and torque were both increased throughout the RPM range.

The Dyno

With the Pulstar plugs in place and no other modifications or adjustments, the single-cam Civic spun the rollers to the tune of 89.25 wheel horsepower and 92.40 lb-ft of torque. This was a gain of 2.98 horsepower and 3.34 lb-ft of torque. These increases in output account for a 3.5-percent jump in horsepower and a 3.8-percent increase in torque. Beyond the dyno, the Civic ran smooth and revved through the RPM range without hesitation. With these results, this is a modification that isn't hard to wrap your head around, its a no brainer.

THIS METHOD OF COMBUSTION SHOULD RESULT NOT ONLY IN INCREASED EFFICIENCY IN THE IGNITION AND FUEL SYSTEMS BUT ALSO MAKE WAY FOR MORE POWER TO BE GENERATED DURING THE POWER STROKE.