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## Multi-fuel combustion using a dual signal plasma igniter

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Considering the present global industrial landscape, the availability of fuel sources takes on an ever-increasing importance. Fuel quantity, type, and availability have become an issue, as has the consistency in the blend and purity. This is a major strategic problem when our armed forces must scavenge for their fuel stocks while in a combat environment. One of the clear solutions is to provide combustion environments that will allow for the use of a variety and mixture of fuels all in the same engine. What's needed is a highly-energized ignition source that fills the combustion environment with a widely dispersed field of energy and more importantly that can be used as a diagnostic tool to vary the cycle-to-cycle process and adjust for the type and amount of fuel as well as the timing of the ignition. The Quarter Wave Coaxial Cavity Resonator (QWCCR) plasma plug is a highly efficient microwave frequency voltage step-up device that is capable of heating and ionizing gases and igniting a wide variety of air fuel mixtures. It creates a high-power density oscillating electromagnetic field with uniquely different ignition properties from that of a DC spark. By pumping this energy into the cylinder, this device energizes the air fuel mixture over a large ignition volume. Initial tests have demonstrated repeated cylinder ignition of an internal combustion engine using a QWCCR. This paper will describe the testing of the QWCCR plasma plug on a single dedicated test engine with a variety of fuels.

### Biography

Andrew D Lowery has received degrees of PhD (2012), MS in Mechanical Engineering (2006), BS in Computer and Electrical Engineering (2004) from West Virginia University. Currently, he is the Lead Scientist at Plasma Igniter, LLC. His research interest is in the areas of design and controls, electromagnetics, and engineering education, resulted in peer reviewed publications, including 19 conference proceedings and 10 articles and bound papers. He is a member of the Institute for Electrical and Electronics Engineers, Society of Automotive Engineers, and Sigma Xi, The Scientific Research Society.

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