

## ***Ground-Breaking Ignition Technology from Transient Plasma Systems Proven to Make Gasoline-Powered Vehicles Cleaner and More Efficient***

*Advanced combustion strategies enabled by the TPS Ignition System could result in fuel economy gains higher than 20 percent*

TORRANCE, Calif., June 2022 — New research confirms an untapped advanced ignition technology offers proven solutions for significantly cleaner gasoline engines that auto manufacturers can implement immediately. [Transient Plasma Systems Inc. \(TPS\)](#), the developer of nanosecond pulsed power systems for a variety of applications, today announced new validation of its ability to increase fuel efficiency and reduce emissions for internal combustion engine vehicles, providing an immediately deployable, urgently needed effective solution for reducing greenhouse gas emissions.

“Based on our testing, TPS ignition technology offers potential significant benefits toward improving combustion, engine efficiency and performance,” said Michael Franke, Senior Vice President of Engine and Hybrid Powertrain Systems of [FEV](#).

[FEV](#), a globally leading service provider in vehicle and propulsion system development and testing, evaluated the performance of the TPS nanosecond pulsed power ignition system on the Toyota 2.5-liter, direct and port fueled injection, inline 4-cylinder gasoline engine commonly used in the Camry line of vehicles. The “Dynamic Force Engine” achieves one of the world’s best thermal efficiencies of 40 percent in gasoline powered vehicles [according to Toyota](#).

The Toyota 2.5L engine was tested at FEV North America and results indicate improvements over the stock ignition system. Data was collected with the stock ignition system with a representative ignition strategy, followed by comparison to a drop-in replacement with the TPS nanosecond pulsed power ignition system (coil and plug). Results indicate a brake-specific fuel consumption (BSFC) benefit of up to 6 percent with minor calibration changes, which include a multi-pulse ignition strategy, increased external EGR, and optimized spark timing. With the TPS ignition system, there was no degradation of combustion with increased EGR.

Finally, the TPS Ignition System showed improved tolerance to lean burn compared to the stock ignition system, allowing the potential for future combustion strategies similar to the lean burn strategy in the Mazda Skyactiv-X.

The combustion strategies enabled by the TPS Ignition System could result in fuel economy gains greater than 20 percent, as illustrated by the simulation results in the [2020 report by Sandia National Labs to US DOE](#).

“The world cannot transition to widespread electric vehicle adoption overnight, despite the ambition and commitments of automakers and legislators. Hundreds of millions of internal combustion engine vehicles are projected to be sold round the globe in the next decade,” said Dan Singleton, CEO & Co-founder of Transient Plasma Systems. “There is an immediate need to produce cleaner gasoline engine vehicles to meet the global CO<sub>2</sub> target and automakers recognize advanced ignition systems as a necessity to achieve the last great CO<sub>2</sub> reduction. These test results, along with our significant progress in reducing cost, size and energy consumption of the TPS Ignition system, demonstrate its nearing commercialization.”

“Vehicles with internal combustion engine technology will continue to exist along with electric vehicles for decades. It is imperative that the transportation world continues to improve the combustion engine technology,” said Jim Demetriades, Chairman of Transient Plasma Systems and CEO of Kairos Ventures, the Los Angeles venture capital firm funding TPS. “These impressive test results on one of the world’s most efficient engines confirms our faith in TPS technology as a groundbreaking approach to reducing emissions from combustion engines and improving the environment.”

TPS Transient Plasma Ignition System is a cost-effective and widely validated new tool for high-dilute combustion strategies, reduced NO<sub>x</sub> emissions, and efficient engine modes in challenging situations. The low-energy/high-power ignition system increases efficiency in a variety of combustion engine designs, including gasoline-powered, hybrid, and natural-gas-powered vehicles as well as green fuels like hydrogen.

Unlike competing systems that involve costly engine redesigns and displacement of current engine architecture, the TPS Transient Plasma Ignition System works alongside existing engine designs and efficiency techniques such as exhaust gas recirculation (EGR), gasoline direct injection (GDI), turbocharging and e-boost, significantly enhancing performance with a simple solution. TPS, as a technology development firm, has taken the technology to the point of a design that has the potential to meet size, cost, and performance metrics of gasoline and natural gas engine OEMs.

### **About Transient Plasma Systems Inc. (TPS)**

TPS’s mission is to harness the power of plasma and translate its previously inaccessible capabilities to provide solutions for environmental challenges and real-world problems. TPS’s flagship product the Transient Plasma Ignition System is designed specifically for automotive OEMs and parts manufacturers as an easy-to-integrate, cost-effective and widely validated solution.

TPS was honored as one of Automotive News’s 2020 PACEpilot award recipients and its technology has been validated by Sandia National Labs, Argonne National Laboratory, vehicle, and engine OEMs, and is currently being developed for commercial applications.

To learn more, please visit [www.transientplasmasystems.com](http://www.transientplasmasystems.com).

### **About FEV**

FEV is a leading international, independent service provider for hardware and software in vehicle and powertrain development, as well as the energy industry. The range of competencies includes the development and testing of innovative solutions up to series production and all related consulting services. The FEV Group currently employs 6500 highly qualified specialists in customer-oriented development centers at more than 40 locations on five continents. For more information, please visit <https://www.fev.com/>