

November 15, 2023
Diamond Electric Holdings Co., Ltd.

<Project A: Development of Ammonia Combustion Technology>

Stable Combustion with 100% Ammonia Established in Reciprocating Engines

— Now Aim to Further Expand the Stable Combustion Range with Ultra-High Energy Ignition System

Diamond & Zebra Electric Mfg. Co., Ltd. (Diamond Electric Holdings group; Headquarters: Osaka; President: YuuRi Ono) has successfully achieved arduous stable combustion of 100% ammonia fuel in the low-rotation, low-load range within the required standards for commercial vehicles, in the development of <ammonia combustion technology>. This is the world's first achievement* as far as publicly announced in an experiment with an existing ammonia-fueled reciprocating engine**.

In recent years, along with efforts to electrify automobiles as a countermeasure against global warming, research on the combustion of ammonia as a carbon-free fuel is progressing. Compared to conventional gasoline, one of the factors for stable combustion of flame-retardant fuels such as ammonia, a very high-energy spark discharge is required in the ignition system.

As a manufacturer developing ignition/combustion technology, we have been pursuing development of new ignition systems to make the most of reciprocating engines in a decarbonized society. In 2018, "Project A" was launched by establishing [A-Lab (Combustion Lab)] within Diamond Electric Mfg. Co., Ltd., the Tottori-based group company. Using the special ignition device that can freely change the discharge energy and current characteristics of ignition coils, we have been independently accumulating basic research on ammonia and hydrogen combustion. Our research to apply the ultra-high energy ignition system to all engine operating ranges and to raise the mixing ratio of ammonia as much as possible will be carried forward.

The results of this research were presented in a paper at the 61st Combustion Symposium B12: Engine Combustion II on November 15.

Our new vision "Contribute to the Improvement of Global Environment by Connecting Cars and Homes with Manufacturing" stated in our medium to long-term management plan "Scrum of Fire", our intent as a public company will be to continue to strongly support our customers while contributing to the enrichment of society through our Monozukuri.

* An engine that converts the reciprocating motion of the piston caused by the gas expanded by thermal energy into rotational motion by means of a shaft and crank, such as a general gasoline engine.

** According to our own research.

Related release: *Diamond & Zebra Electric Mfg. Develops World's First Ammonia Combustion Technology - Aiming to Provide Ultra-High Energy Ignition System for Engine with Next-Generation Fuels Including Ammonia* - <https://www.diaelec-hd.co.jp/en/info-en/17371/>

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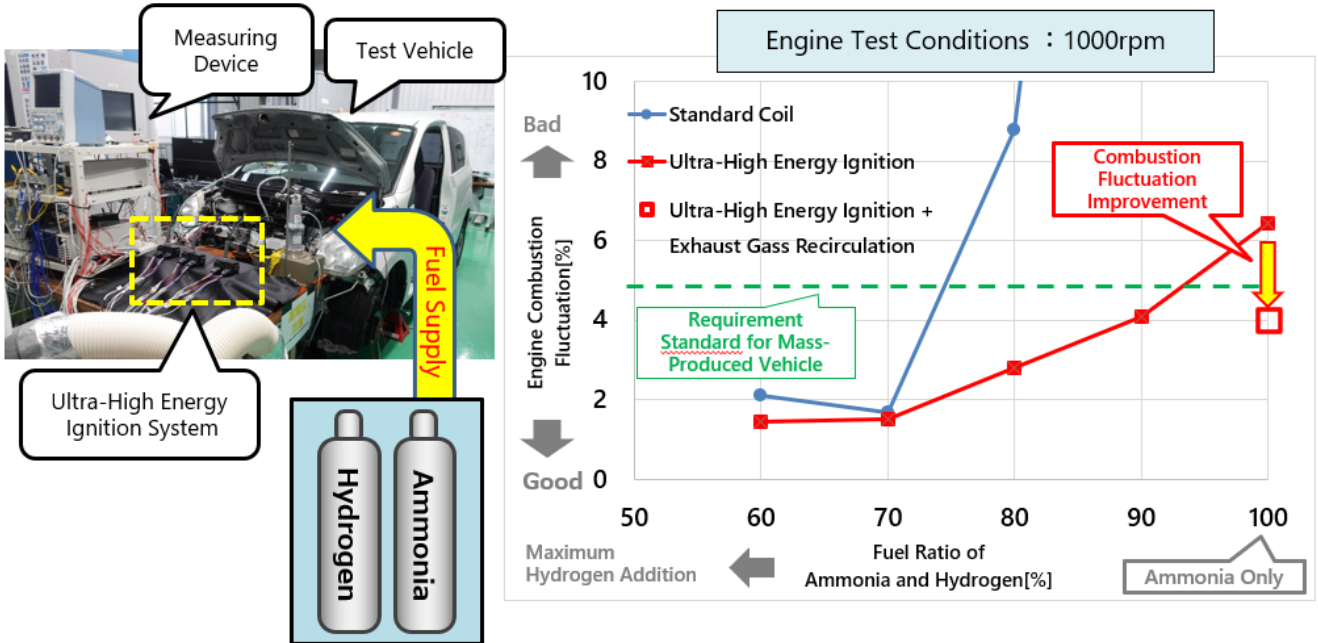
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News Release

Effect of Expanding Combustion Limit by Enhancing Ignition System Energy in Existing Mass-Produced Engines



Establishment of stable combustion at 100% ammonia by making full use of ultra-high-energy ignition system and exhaust gas recirculation system.