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## MAZDA PREMACY HYDROGEN RE HYBRID

### New Mazda Premacy Hydrogen RE Hybrid (Exhibition Model) A fresh approach to the future of Zoom-Zoom

**TOKYO, JAPAN**, Oct. 24, 2007 - Thanks to its combination of Mazda's trademark Zoom-Zoom performance and excellent environmental efficiency, the hydrogen rotary engine (Hydrogen RE) is one of the leading lights in Mazda's efforts to develop the power plant of the future. To demonstrate the exceptional environmental performance of this engine that burns hydrogen to generate motive power and emits zero CO<sub>2</sub>, Mazda has been leasing the Mazda RX-8 Hydrogen RE to corporations and local government bodies since 2006. In particular, the RX-8 Hydrogen RE not only offers clean performance, it also maintains a driving feel characteristic of a vehicle powered by a conventional gasoline internal combustion engine. With its dual-fuel system, the RX-8 Hydrogen RE can be switched between hydrogen and gasoline fuel at the touch of a button, and although it is an alternative fuel vehicle, it offers all the other acclaimed attributes of the base model RX-8, including its seating capacity for four adults.

The new Mazda Premacy Hydrogen RE Hybrid that Mazda is exhibiting at this year's Tokyo Motor Show is currently under development, and scheduled to commence leasing in 2008. Incorporating the dual-fuel system of the RX-8 Hydrogen RE, it is a further evolution in terms of



Mazda Premacy Hydrogen RE Hybrid.



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practical use and driving performance thanks to improvements in the Hydrogen RE and the use of a new hybrid system.

- Extended range between refuelings
- Powerful fun-to-drive feeling
- Increased seating capacity for five adults and greater luggage space

The 2007 Tokyo Motor Show model also features Mazda Biotechmaterial derived from plants that contribute to further reductions in CO2 emissions. These materials exhibit excellent resistance to heat, shock and wear, as well as weather and fire damage. They also offer outstanding versatility and can be employed for interior plastic parts, seat covers and in a variety of other areas.

Mazda is actively engaged in developing unique technologies, including the hydrogen rotary engine, as part of its efforts to achieve the early realization of a sustainable society.

In particular, Mazda clean energy vehicles running not only on hydrogen but also on gasoline and diesel are expected to play a major role during the process of developing a hydrogen infrastructure.

### **The evolved hydrogen rotary engine delivers Zoom-Zoom power**

Output of the evolved power unit is increased by 40% compared with the RX-8 Hydrogen RE resulting in much better acceleration performance. The hydrogen rotary engine, the core unit of the model, is changed from a longitudinal to a transverse layout and its intake/exhaust resistance and combustion efficiency are improved to yield high output across a wide range of engine speeds.

In addition, a new concept hybrid system to match the new hydrogen rotary engine has been developed. The conventional hydrogen rotary engine has problems of low torque and poor combustion efficiency in the low rev range. The new system overcomes both of these problems and, combined with increased hydrogen capacity, extends the hydrogen-fueled range to about 200km or twice that of the RX-8 Hydrogen RE. The vehicle is also equipped with the highly acclaimed dual-fuel system of the RX-8 Hydrogen RE, further enhancing its practical use.

The hybrid system efficiently converts energy from hydrogen combustion into electricity that powers the electric motor. Thanks to progress in electric drive technology, the system realizes high energy-efficiency and a quick response for powerful driving performance allied with low fuel consumption. Acceleration kicks in the instant you hit the accelerator, creating a dynamic feeling from the synchronized engine and motor power.

### **Energy flow pattern according to driving conditions**

The main components of hybrid system-the hydrogen rotary engine and generator, inverter,

motor, and battery-are optimally controlled to generate electricity, recharge and discharge the battery in accordance with driving conditions.

[When pulling away from stop]

- Running on battery power

[During regular steady running]

- Running on hydrogen rotary engine and generator power

[During acceleration]

- Running on hydrogen rotary engine/generator power + battery power

[During deceleration]

- Regenerated by motor during braking and engine braking

[Stationary]

- The hydrogen rotary engine stops idling unless the battery needs recharging.

### **Mazda Biotechmaterial\* 1 for a resource-recycling society**

The new Mazda Premacy Hydrogen RE Hybrid is a showcase of other original Mazda environmental technologies. Mazda is deeply involved in collaborative developments with companies, universities\*2, and the government in Hiroshima prefecture as part of the New Regional Consortium Research Development Programme supported by Ministry of Economy, Trade and Industry. This enabled us to become the first automaker to develop a plant-sourced bioplastic with a high-quality appearance as well as shock and wear resistance suitable for extrusion-molded automobile interior parts.

In a joint venture with Teijin Ltd, a company with research labs in Chugoku and Shikoku, and Teijin Fibers Ltd, Mazda succeeded in becoming the first in the auto industry to develop a 100% plant-sourced biofabric made of polylactate fibers that exhibits excellent wear, fire and weather resistance for use in automobile seat covers. The new Mazda Premacy Hydrogen RE Hybrid uses these Mazda Biotechmaterial for its interior trim and seat covers.

\*1 General term for Mazda-developed plant-sourced materials including bioplastic and biofabric.

\*2 Consortium members are: Hiroshima University, Nishikawa Rubber Co., Ltd., Hiroshima Prefecture Technical Research Institute (Seibu Industrial Technology Center), Daikyo-Nishikawa Co., Ltd., Japan Steel Works Ltd., Kinki University Engineering Department, National Research Institute of Brewing, Yasuhara Chemical Co., Ltd., MANAC, Inc., Mazda Motor Corporation (2 universities, 6 corporations and 2 experimental and research organizations)

### **Shock-resistance, heat-resistance and a quality appearance**

Mazda has developed a unique bioplastic suitable for interior parts. To promote crystallization of polylactic acid, researchers developed a seed crystal composed of polylactate with a modified

molecular structure that raises the melting point. They also developed a new compatibilizer to efficiently disperse flexible constituents to improve shock absorption, resulting in a material with enhanced capability to evenly disperse shock energy. The developed bioplastic, which is more than 80% plant-sourced, exhibits greatly improved shock absorption and heat resistance. And unlike conventional bioplastics whose properties are suitable for press-forming only, Mazda's bioplastic can be extrusion-molded. Consequently, this bioplastic achieves the qualities and appearance required for use in car interior parts.

**Combines the properties of wear-resistance, flame-resistance and weather-resistance demanded of fabric for use in automobiles**

Mazda's biofabric was developed using a crystallizing agent for polylactic acid with a high melting point polylactate molecular structure (stereo-complex structure) that allows application throughout the entire bio-fiber. The resulting biofabric is one hundred percent plant-sourced and exhibits exceptional wear-resistance, flame-resistance and weather-resistance.

**Introduction of bumper-to-bumper recycling**

Mazda is the first automaker to introduce bumper-to-bumper recycling-a system that collects damaged bumpers from cars on the road, almost completely removes the paint and reuses the material in new bumpers. Since its use in the RX-8 in March 2005, the recycled material has been introduced in new models and taken on more applications. Mazda Premacy Hydrogen RE Hybrid will also incorporate material recycled in this way.

**Optical sorting technology discriminates presence/absence of paint**

The key to bumper-to-bumper recycling is a unique optical sorting technology. In the recycling process, collected damaged bumpers are pulverized and formed into pellets with up to 98.5% of the paint removed. The optical sorting technology can accurately distinguish between pellets on the basis of paint content. As shown in the illustration, pellets flow down from the shooter past two CCD cameras. By blasting the pellets that still contain paint with compressed air, it is possible to achieve a paint removal rate of about 99.9%. The paint-free pellets are mixed in with fresh material to form new bumpers. Pellets that are rejected in the sorting process can be used in material for undercovers, splash guards and similar components.

**Premacy Hydrogen RE Main Specifications** (target values)

Name	Mazda Premacy Hydrogen RE Hybrid	
Vehicle	Overall length	4555mm
	Overall width	1745mm
	Overall height	1615 mm
	Wheelbase	2750 mm
	Seating capacity	5 persons
Engine	Type	RENESIS hydrogen rotary engine (dual-fuel system)
	Fuel	Hydrogen and gasoline

Motor	Maximum power	110 kW
	Type	Synchronous motor
Generator	Type	Synchronous motor
Battery	Type	Lithium-ion (Li-ion)
Tires	Front/rear	195/65R15 DUNLOP ENASAVE(non-petroleum tire)
Name		Mazda Premacy Hydrogen RE Hybrid

## COLUMN

### Progress in development of Mazda's hydrogen vehicles

Mazda developed the first HR-X equipped with a hydrogen rotary engine in 1991. A hydrogen rotary Roadster experimental vehicle was developed in 1993, and in 1995 we tested a hydrogen rotary engine version of the Capella Cargo for the first time on Japan's public roads. On obtaining permission from the Ministry of Land, Infrastructure and Transport, we made the world's first public road test of the prototype RX-8 Hydrogen RE in October 2004. More recently, in February 2006, Mazda began leasing the RX-8 Hydrogen RE mainly to government agencies and corporations.

1991 First HR-X with hydrogen rotary engine unveiled at Tokyo Motor Show.

1993 Second HRX-II with hydrogen rotary engine unveiled at Tokyo Motor Show.  
Mazda develops Roadster experimental vehicle with hydrogen rotary engine.

1995 Hydrogen rotary powered Capella Cargo becomes first car of its kind to be tested on public roads in Japan.

2003 Development version of RX-8 Hydrogen RE unveiled at Tokyo Motor Show.

2004 Mazda begins commercial leasing of RX-8 Hydrogen RE, world's first for a hydrogen RE.

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### Other articles in Environmental

- [MAZDA DEVELOPS WORLD'S FIRST BIOFABRIC MADE WITH 100 PERCENT PLANT-DERIVED FIBER FOR VEHICLE INTERIORS](#)
- [STUDENT CONSERVATION ASSOCIATION AND MAZDA PARTNER TO DRIVE YOUTH CONSERVATION EFFORTS THROUGH MULTIMEDIA CONTEST](#)
- [MAZDA DELIVERS HYDROGEN ROTARY ENGINE VEHICLE TO JAPAN AUTOMOBILE RESEARCH INSTITUTE](#)