

## March 2006

### TOYOTA FINE-T

- The latest step in Fuel Cell Hybrid Vehicle (FCHV) development
- Efficient packaging gives interior space of an Avensis within a body of Yaris-like dimensions
- High-tech but welcoming interior environment
- Easy access with movable seat and gull-wing doors
- Equipped with Toyota's latest fuel cell stack and 700bar hydrogen storage tank
- Four-wheel large-angle steering and drive through in-wheel electric motor assembly
- Innovative components layout gives low centre of gravity and moment of inertia
- 360-degree camera coverage gives new level of active safety
- Extensive use of carbon-neutral materials

Toyota's vision of automobile manufacturing aims to minimise environmental impact, while maximising what people expect from a vehicle and achieving ever greater levels of safety. The Fine-T was developed according to this vision, with a fuel cell system that ensures excellent environmental performance. Thanks to a four-wheel independent large-angle steering system, with an electric motor in each wheel, it also offers unprecedented manoeuvrability. As a concept, it marks the completion of another stage in the evolution of Toyota FCHVs.

#### Exterior design

The Fine-T's design is based on Toyota's Vibrant Clarity principles and embraces concepts of beauty and advanced technology. The compact, "one-form silhouette" shape gives the car a changing appearance when viewed from different angles.

By locating the compact fuel cell unit under the vehicle floor and using in-wheel electric motors, the designers achieved interior space that matches a an Avensis, yet the exterior dimensions approximately match those of a Yaris.

#### Interior design

The interior is designed to give a sense of spaciousness while feeling snug at the same time, using the guiding principle of giving something high-tech a more warm and welcoming feel. This can be seen in the area around the driver's seat, with low instrument panel giving a good, broad view of the large multi-information display. The relaxed, calming atmosphere is further emphasised by variable lighting intensity, over the instrument panel and door trim.

Ease of entry and exit is another important quality: as the gull-wing doors open, the driver's seat rotates outwards; once the driver is seated, the seat automatically moves back to the regular driving position. When ready to leave the vehicle, the driver presses a button to move the seat to the exit position. The drive-by-wire steering automatically stows away, the door opens and the driver simply stands up.

#### Advanced fuel cell hybrid system

Toyota's state-of-the-art fuel cell hybrid system shows how far engine technology has come towards having a zero effect on the environment. Hydrogen supplied from Toyota-built 700bar storage tanks reacts chemically with oxygen from the air to produce electricity in the fuel cell stack (the Toyota FC stack). The stack, like the vehicle's storage battery (when required), drives the electric motors that power the vehicle. A power control unit ensures efficient management of the two power sources.

To fit within the Fine-T's compact size, a new Toyota FC stack has been developed that is smaller and gives higher performance. It uses an alloy catalyst, which considerably reduces the amount of precious metals used. The units are mounted beneath the vehicle floor, freeing up more space in the cabin, while also giving a radically lower centre of gravity and low inertia moment that contribute to a spirited driving experience and large steering angles.

### **Unparalleled manoeuvrability**

The Fine-T makes big advances in easy manoeuvring when driving on narrow roads or parking, thanks to independent four-wheel large-angle steering and independent four-wheel drive, using in-wheel motors with integrated drive power and wheel turning-angle control.

These drive systems contribute to the vehicle's notably low centre of gravity and low moment of inertia, giving the Fine-T an extremely strong balance between driving pleasure and stable handling.

The drive-by-wire steering connects the driver controls to actuators that operate the vehicle function, giving an unprecedented degree of freedom when manoeuvring. For example, in front/rear axle turning mode, the Fine-T can be turned around from the front or rear, something that is particularly useful when moving into or out of parallel parking spots. In directional change mode, continuously variable steering of the front and rear wheels allows a change of direction of almost the entire length of the vehicle in four directions, allowing for easy U-turns and exits from tight parking spaces. On-the-spot turning mode allows the vehicle to rotate through 360 degrees on its own axis.

### **Preventing accidents**

The Fine-T is equipped with peripheral monitoring cameras and a large display screen. A front-view camera is positioned above the number plate and a rear-view camera below the Toyota badge on the back of the vehicle. Left and right side cameras are located by the door handles. Together, these cameras monitor the area right around the vehicle, giving the driver clear sight of any obstacles or hazards, eliminating blind spots.

### **Carbon-neutral materials**

The strong environmental performance of the Fine-T extends to a substantial proportion of plant-sourced materials being used in the interior fittings. Plants are considered carbon-neutral, as they absorb carbon dioxide through photosynthesis when growing. This means that even if they are burned, the net amount of carbon dioxide released into the atmosphere remains constant over their entire life cycle.

Toyota looked at the possibilities of using carbon-neutral materials over a wide range of interior elements, processing polylactic acid (PLA) from sugar cane, kenaf and other plant fibres for use in making the door trim, the suede-like headlining, seat nets and floor mats.

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