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NEWS

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FORD'S *SYNERGY 2010* CONCEPT CAR EXPLORES FUTURISTIC TECHNOLOGY AND DESIGN IDEAS

Dearborn, Mich., Dec. 13 -- Ford's scientists, engineers and designers have created a new concept car test-bed to explore the technological frontiers of the circa-2010 family car.

Incorporating advanced technologies evolving from defense and space programs as well as design cues borrowed from race cars, the new *Synergy 2010* is a dramatically styled concept car that also explores futuristic alternatives that could theoretically triple the fuel efficiency of a typical family sedan.

Alex Trotman, Ford's chairman and chief executive officer, unveiled the concept car at the company's year-end news conference today. It will be on display at the North American International Auto Show in Detroit from Jan. 6 - 15.

"*Synergy 2010* is a good example of the kind of quantum leap, breakthrough thinking we're encouraging in our new global alignment," Trotman said. "It's also a good example of our focus on affordability -- the ground rules are that its costs will have to be comparable to today's mid-sized car.

"This is very much a 'stretch' exercise, especially when it comes to making this advanced technology affordable," he continued. "But pushing the leading edge is what we're all about these days."

Experimental 1.0-liter engine, flywheel provide 'hybrid' power

"A key purpose of this concept car is to explore how some intriguing, extremely fuel efficient technologies could be packaged in a well styled car of the future," explained Bob Mull, director of New Generation Vehicle programs.

Loaded with advanced technology features, it's one-third lighter and 40 percent more aerodynamic than today's sleekest Ford, yet still roomy enough for a family of six.

The *Synergy 2010* is a "hybrid electric" vehicle, which, generally defined, contains two power sources -- usually an internal combustion or gas turbine engine or fuel cell, and a second power source, such as a flywheel or battery.

In the *Synergy 2010*, a small, 1.0-liter direct-injection, compression-ignited engine mounted in the rear would power a generator that produces electricity for motors located in each wheel. Up front, a flywheel would collect excess engine and braking energy, which in turn would be released to augment the engine when, for example, the car needed to accelerate quickly or climb hills.

In a direct-injection, compression-ignited engine, high pressure or heat is used instead of spark plugs to ignite the fuel, resulting in higher efficiency. Theoretically, the *Synergy 2010*'s performance with this smaller engine would be comparable to today's mid-sized family sedan because of its decreased weight, improved aerodynamics and lower rolling resistance.

"The *Synergy 2010* is not a buildable product at this time," Mull explained. "It still requires extensive research on many of the design and technology concepts and their manufacturing processes to make it an affordable product. But it does reflect the variety of technologies that we're exploring to make our cars and trucks more efficient and environmentally friendly."

Lightweight materials also improve efficiency

At 2,200 pounds, the *Synergy 2010* weighs in about 1,100 pounds lighter than a mid-sized sedan today. Trimming pounds from the concept car with the use of advanced materials also was critical to improving its fuel economy.

Planning for all-aluminum unibody construction of the car was the primary contributor to weight-savings, cutting about 400 pounds. Because of this basic weight

reduction, other components sized according to vehicle mass -- such as the engine, flywheel, radiator and brakes -- also could be down-sized, saving about 300 pounds.

"Since 1992 Ford has had an intensive effort under way to increase its use of aluminum and already, we lead the worldwide auto industry in its use on high-production vehicle lines," said Bill Stuef, manager of Vehicle Design and Proportion Techology. "The company used 25 million pounds of aluminum sheet in 1995, about five times more than all other auto manufacturers combined. Ford also leads the industry in aluminum stamping expertise.

"But while Ford now is close to bringing baseline manufacturing costs for aluminum in line with those of steel, aluminum material costs still are up to four times higher," he explained. "We're working closely with aluminum suppliers on innovations to bring this lightweight metal's costs down dramatically," he added.

Ford expects that aluminum could be used in the construction of other key components on the *Synergy 2010* -- including the suspension and brakes -- for additional weight savings. And the company foresees using more high-strength, low-alloy steel as well as other advanced, lightweight alternative materials including composites and magnesium on key components to continue the whittling.

Fins, spoilers and 'air fences' manage air flow

No longer driven to plan around conventional powertrain technology, the concept car's design team found they could "throw out the book" and rethink all aspects of the car's styling.

"The *Synergy 2010* reflects a comprehensive design effort to combine both aesthetics and technology -- form and function -- in a complete vehicle," said Rick Wells, chief designer on the project. Dramatically improving aerodynamics to improve the car's fuel economy was a key consideration.

"The car's most distinctive design element -- the fin-shaped vertical front fenders -- begin as 12-inch-high, half-inch-wide light manifolds, then sweep back toward the car's streamlined body to create an air extractor for the cooling system. They also house the rear-view cameras that replace rear-view mirrors, and they function as air-

management devices -- like 'air fences' in Formula One racing -- to control the air along the sides," Wells said.

The fenders surround a front bumper that also acts as a spoiler -- as in many race cars -- to help cut aerodynamic drag and improve fuel economy. *Synergy 2010*'s coefficient of drag is .20. This, along with a reduced frontal area, results in a 40 percent improvement in aerodynamics compared with Ford's most streamlined car today, the Ford Taurus.

The *Synergy 2010* also features an all-glass roof, which is vacuum-coated with layered solar load reduction films that reflect summer heat and retain winter heat. Solar cells in the roof power a fan that purges hot air from inside when the car is parked -- a technology concept borrowed from Ford's Ecostar electric vehicle demonstration program.

Futuristic features have global outlook

As if imagining what this car of the future would look like inside and out weren't enough, *Synergy 2010* designers took the project one step further by exploring some other features that could potentially be on board a 2010 family car:

Voice activation: To maximize spaciousness and minimize information overload, virtually all the electronic controls are voice-activated -- resulting in an instrument panel totally devoid of switches, levers or buttons. The driver monitors vehicle basics by checking a heads-up display projected onto a glass card from a computerized "sourced image" at the back of the steering wheel. Here, colorful computer animation updates vehicle speed, tachometer, temperature and the like. Designers also demonstrate how this system could act as a futuristic video answering machine.

A separate liquid crystal message center positioned in the middle of the instrument panel comes alive when voice-activated. Here, the driver can access features like an advanced navigation system, the entertainment system, climate controls -- even the Yellow Pages™. This message center is flanked by screens relaying video from the rear-view cameras.

Aircraft design: The steering wheel design resembles an aircraft yoke, with the top and bottom thirds of the rim removed so that the driver has an unobscured view of the electronic displays as well as easier entry and egress.

Easily left- or right-hand-drive: Also reminiscent of aircraft, the car's steering column attaches to a cantilevered arm mounted in the center of the vehicle. This makes the vehicle easily adaptable for manufacture for either right- or left-hand drive markets.

New seating concepts: The driver's seat stays put while the accelerator and brake pedals adjust forward or back, up to six inches, to get the leg length just right. The steering column telescopes, too. The seat moves vertically and reclines, and when it does, the armrest moves with it. The driver and front passenger seat also are extremely lightweight, foregoing thick padding for see-through webbing in strategic points, while still providing expected comfort and support.

Safety features: The *Synergy 2010* features integral seat restraints, seat belt pretensioning, an automatically-retracting rear headrest, an advanced integral child safety seat and a design that would accommodate future head-and-chest side-impact air bags.

Lighting: The dramatic front headlights feature high-intensity discharge lighting, while tail lamps and turn signals stand out in neon. Projection lighting is featured on the fog lamps.

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