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The Mix-and-Match Car of the Future

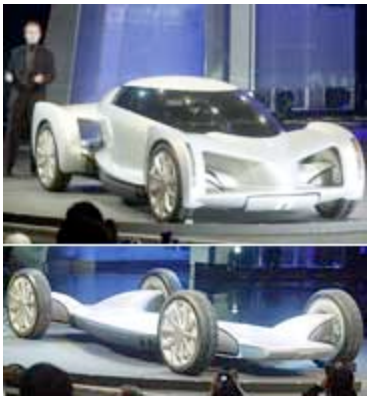
By DANNY HAKIM

DETROIT -- THE car of the future, according to General Motors (news/quote), will have its engine encased in the floor and need no gasoline. It will also have a body and interior that can be replaced as moods change, electronically connected components instead of mechanical parts, and a power source that can serve your home from the driveway.

A mockup of the car is on display here this week at the North American International Auto Show. This concept vehicle, called the Autonomy, has few moving parts other than the wheels and is part of G.M.'s continuing research into cars powered by fuel cells, a source that holds the promise of emitting only water and heat by relying on hydrogen instead of gas.

Most automakers, including G.M., are putting a greater emphasis on ways to make fuel cells fit into conventional cars and trucks. An experimental pickup truck shown by G.M. in August had a fuel cell that took up a bit more than a third of its bed. But adapting it to cars will be costly.

"I think, by the end of the decade, we'll see hundreds of thousands of fuel cells on the road," said Lawrence D. Burns, G.M.'s vice president for research and development. Whatever the timetable, the emphasis is shared by the Bush administration, which chose the



The Associated Press
The body of the Autonomy, a General Motors concept car, would pop off the base and be replaced whenever an owner's tastes shifted.

auto show as the occasion to offer a fuel-economy plan focusing on fuel-cell development.

Aside from its effort to squeeze fuel cells into conventional cars, trucks and buses, G.M. had a separate team of engineers and designers envision a vehicle unfettered by the constraints of the automobile, which for a century has been designed around an internal combustion engine and mechanical parts.

The result is a vehicle that comes in two parts. The first is what G.M. engineers call the skateboard, a six- inch-thick platform encasing the engine and the car's computer system. The body, including the seats and interior, will perch on the platform, with features like braking, steering and acceleration controlled digitally by electrical impulses.

At a recent demonstration, G.M. engineers showed a mockup of the skateboard, which was almost 15 feet long and shaped like a flattened carafe, with Goodyear tires and several thin, parallel heating vents curving up each side. The second part, the body, looked like a sci-fi version of a Formula One racecar.

G.M. envisions that the skateboard will last about 20 years, with the body popped off and replaced with a version customized to the owner's tastes far more often. "This is like a blank canvas, and you can paint whatever you want on top," said Adrian Chernoff, a program architect on the project, adding that the body could be switched "in the time it takes for an oil change."

Mr. Burns said that G.M. hoped to produce a working prototype of the Autonomy by the end of the year, but with an 11-inch-thick skateboard, to fit hydrogen tanks large enough for a trip of 100 to 150 miles.

Such a vehicle would drastically alter automobile assembly, raising questions like who would make the bottom and who would make the top.

Of course, concept cars often resemble an era's vision of the future more than the actual future. G.M.'s Firebird concepts of the 1950's paid homage to a booming airline industry, with turbine engines and tail fins that made it seem as if the cars were made from spare parts of fighter jets. Other concepts featured cool gizmos that never made it into production, like the rear-view camera mounted on the back of the 1956 vision of the Buick Centurion.

As for the fuel cell, the major automakers tout it as a silver-bullet answer to many of the problems that now cause their industry to butt heads with environmental groups. In their ideal form, fuel cells would replace gasoline with hydrogen and emit only water and heat. The cells strip electrons from hydrogen atoms and use them as an electrical current, then reform the hydrogen atoms, combining them with oxygen to form water vapor. The technology could in principle be as useful in supplying power to homes and industry as in powering vehicles.

So far, however, the fuel cell has mainly served only as an argument

against regulatory pressure to make short-term improvements in fuel economy. At a Senate commerce committee hearing in December, G.M.'s vice president for product development, Thomas J. Davis, cited fuel cell research as a reason that existing fuel economy standards should not be raised.

The standards have not significantly changed for more than a decade, and fuel economy gains have been reversed in recent years as sales of trucks have overtaken sales of cars. To address the issue, the Clinton administration emphasized development of high-mileage gasoline-fueled vehicles, a goal on which the big three automakers have been spending $1 billion a year.

"We'd rather take those dollars and move to solutions like the fuel cell faster," Mr. Burns of G.M. said in an interview. And that, in essence, is the vision the Bush administration has now embraced.