

drag what's left of the U.S. auto industry into the 21st century. "We are seeing an explosion of ideas," says Tom Libby, president of the Society of Automotive Analysts, based in Birmingham, Mich. "The automotive industry was very much an oligopoly, but the turmoil and uncertainty have changed that. Now hundreds of new entrants are vying to be innovative."

These upstarts are also taking advantage of the fact that for the past 30 years big car manufacturers have flooded the market with dozens of brands for every type of consumer—fracturing the auto market into a series of niches. Which plays directly into the hands of small competitors. "It's a great opportunity for small manufacturers with niche products," says Laurie Harbour-Felax, president of the Harbour-Felax Group, a Detroit-based automotive research firm. "The whole business is going that way."

By the end of 2010, small carmakers will bring to market luxe high-performance cars as well as purpose-built vehicles for package delivery and mid-distance commutes of, say, 30 miles or less. Even in-town drivers who are going only 10 miles are getting their own brands.

Of course, some doubt the wisdom of playing it small in the car business—especially after the economy rebounds. The big car companies in Detroit, Toyota City and Stuttgart won't go down without a fight and are already plotting their comebacks. Still, there is palpable swagger among small carmakers. Here are six at the starting line, waiting to race for the biggest prize of all: the future of the American automobile.

## BATTERY POWERED

3Prong Power doesn't make cars, it hacks them.

PAUL GUZYK AND DANIEL SHERWOOD ARE COMPUTER GEEKS WHO co-founded 3Prong Power, a Berkeley-based business that transforms standard Toyota Priuses into all-electric green machines.

In 1999 Guzyk sold his share of InfoHouse, a New York City-based Internet services business, and relocated to California. There he rediscovered an old passion for cars after tinkering with a Prius. He found that in many ways the Toyota hybrid was more like a computer than an automobile. Notably, it ran on recognizable computer standards similar to those found in an office network. "I found that modifying the Prius is like getting your computer to do what you want it to do," says Guzyk, 44.

In 2006 he was introduced to fellow Prius tinkerer Sherwood, 34. Together they gave a 2004 model an all-electric makeover. First they installed a bank of Prius batteries they had salvaged from a junkyard. That didn't work well, so they tried traditional lead-acid batteries, used in electric wheelchairs, which did the trick. Next they developed software that programmed the Prius to run only on its newly enlarged battery pack. Unlike the one in an unmodified Prius, the car's internal-combustion engine doesn't fire up—and burn gas. Presto: instant electric car, albeit one with a range of only about 25 miles.

Being in Berkeley, where there are Priuses on every block, the two realized that there was a real business in treating the world's

# Ready, Set... GO!

A new generation of insurgent automakers are reinventing the cars we drive.

By Jonathan Blum

Photographs by Patrik Giardino

OF ALL THE CHANGES IN THE AMERICAN ECONOMY OVER THE PAST 18 months, perhaps the most startling has been the travails of the major domestic car manufacturers. As the Great Recession wreaked havoc on the credit market and job losses mounted, car sales nose-dived and Detroit finally ran out of gas. General Motors—once a model of American ingenuity and prosperity—was forced into Chapter 11; Chrysler was taken over by Italy's Fiat; and Ford entered survival mode.

But as the risk-averse Big Three struggled, innovation-minded entrepreneurs saw opportunity. Independent carmakers are using a variety of cutting-edge technologies—from electric-powered engines to new construction materials to rapid customization—to



Supercharged: Daniel Sherwood, left, and Paul Guzyk in a Prius that they modified to run on battery power alone

# 54%

UNIMPORTANT\*

## Is it important to you to purchase a car made in the U.S. by an American-owned company such as GM or Ford?

best-selling hybrid automobile as an upgradable gadget. In 2007 they launched their startup in a former Cadillac dealership with less than \$100,000 of their own money. Since then they've added six employees and now expect to do 500 conversions, or some 40 a month, through 2010; at \$4,500 per job, that works out to about \$2.2 million in annual sales.

Critics worry that many unknowns loom in treating cars as electronic devices. Carter Brown, CEO of Boulder Electric Vehicle, in Colorado, warns that aftermarket upgrades create a variety of problems, including warranty, safety and liability issues. For example, who's to blame if a "hacked" car malfunctions and is involved in an accident: the manufacturer, the driver or the firm that altered the car's operating system? "We opted to build our electric truck from scratch for just that reason," says Brown. "Engineering batteries is tough enough without having to deal with an uncertain history on a particular car."

Guzyk responds that a 3Prong-altered car is as safe as any automobile and notes that his firm's upgrade doesn't affect the gas engine; if the battery pack fails, the engine will start—as long as there's gas in the tank. "We can't see any reason to be concerned, with all the safeguards in the car," says Guzyk. "Plus, the people who buy this understand the product. They are willing to be on the leading edge."

## ELECTRIC SHOCK

### Can Bright Automotive finally make electric delivery vans cool?

**JOHN E. WATERS, 48, GOT HIS START DEVELOPING BATTERY** systems for GM's ill-fated mid-'90s electric vehicle, the EV1. For his new startup he rounded up 30 auto industry veterans, including former EV1 compatriots, who have a total of 200 years' experience at Chrysler and other top-tier auto manufacturers. So what glamorous automotive niche do they hope to enter? Answer: electric delivery vans.

For all their blandness, delivery vehicles are the perfect place to test electric car technology. Delivery vans are usually based at a company's depot, so at the end of the day they are easily plugged in and recharged—addressing critics' biggest complaint about all-electric

automobiles. Ranges are limited, but proper scheduling and routing can resolve that problem. What's more, by electrifying their fleets, companies could save 12¢ to 18¢ per mile (depending on the price of fuel). Assuming an average use of 80 to 100 miles a day, that's \$3,600 per vehicle per year. So a company like Verizon, with something on the order of 35,000 vans, could save \$125 million a year if its entire fleet went electric. "Customers can use our technology to improve their bottom line," says Waters, who in January 2007 founded Bright Automotive in Anderson, Ind. and has raised more than \$20 million in private capital.

In April 2009 the company announced its new IDEA delivery van to much fanfare. The vehicle gets 40 miles on a single charge and also features a standard hybrid battery that is recharged by a gasoline engine—like a Prius. The IDEA fetches nearly 40 mpg, but critics claim it's not everything Waters claims. "Technology alone does not sell these things," says Bryan Hansel, president of Smith Electric Vehicles U.S., the Kansas City-based arm of a British company that has made electric delivery vehicles, known in England as milk floats, since 1911. "The customers really do have to agree with the 'why' of an electric vehicle. The 'what' that you sell them happens later."

Bright Automotive argues that the environmental and economic benefits of a green fleet justify the steep up-front cost. "We're replacing vehicles that get 10 to 12 mpg with vehicles that get 40 mpg," says company spokesman Lyle Shuey. "We're saving gas and carbon. It is a huge financial and brand differentiator."

## LAND HO!

### After the recession hit, this boatmaker turned to cars.

**TOM GAMSO DIDN'T GET INTO THE GROUND TRANSPORTATION** business until his yacht-building firm went south. As early as 2007, Atlas Boat Works, which mainly built fiberglass pleasure motorboats in its Cape Coral, Fla. factory, began to suffer from the economic downturn. By 2008 Gamsso's annual revenue had fallen to less than \$1 million, from \$1.6 million in 2004, when he had 10 employees. As fuel prices spiked, Gamsso, 54, wondered if he could turn his expertise to dry-land transportation.

With a bit of research, Gamsso found a sophisticated, readily available supply chain for parts and systems to make electric-powered vehicles. Although four-wheel vehicles were expensive to assemble, he found that three-wheel cars—ideal for short commutes—

Would you buy, or have you bought, a car from a startup auto manufacturer?\*

75%  
No

12% Yes

12% Not sure



Stand by Your Van: The Bright Automotive staff shows off the IDEA delivery truck.

could be built economically. So, factoring in Florida's large elderly communities and the state's level terrain and good weather, Gamso saw a window of opportunity to sell a stylish battery-powered three-wheeler with a top speed of 50 mph and a 33-mile range in city traffic. The unit simply needs to be plugged in at night.

Gamso managed to build a working prototype for less than \$20,000. In late 2008 his company released its first Trycle (pronounced *trickle*). The three-wheeler sells for just \$10,000, plus the cost of a donor bike (any registered motorcycle with a straight frame will do). Making it is simple: Gamso strips the bike and loads it with an electric motor, batteries, a controller and a charger. Then he incorporates the motorcycle's original lights, horn, signals and switches. Finally he adds his signature fiberglass design to create a Trycle, which looks like a cross between an Italian sports car and a golf cart. "There is nothing exotic about the Trycle at all," says Gamso. "It's not nearly as sophisticated as many of the boats we've built. But if you live close to work and where you live is sunny, there's no reason not to ride one of these things."

Although at press time the company had sold exactly two production Trycles, Gamso isn't discouraged. He gets a steady stream of e-mail from retirees in gated communities and businesses looking for a marketing platform, and he's currently developing a simple roof for the three-wheeler. For now, it's a great revenue stream to supplement his boat business. "If I sell one or sell 100," he says, "it's still a home run."

## CAR OR SUPERCAR?

Can an automobile with 400 horsepower get 100 mpg?

**WHAT WOULD A LUXE HIGH-PERFORMANCE CAR THAT'S ALSO fuel-efficient look like?** Peter Collorafi and Doug Pelmeare think they have the answer; they call it the Verde. Collorafi, president of Decatur, Ind. custom-car maker Revenge Designs, and Pelmeare, founder of Napoleon, Ohio performance-engine company HP2g, will debut the car at Detroit's North American International Auto Show in January 2010. They plan to ship it by next July.

The pair say the Verde (*green* in Italian, in honor of Collorafi's parents) will be an American-made supercar that gets 100 mpg from an engine that produces a hefty 400 hp with 500 foot-pounds of torque. Those kinds of numbers would put the Verde in the same category as the Lamborghini Gallardo, which reaches a maximum speed of 201 mph, but with one crucial difference: The gas-hungry Gallardo gets a scant 12 miles per gallon on city streets (and just 20 on the highway).

To accomplish these seemingly incompatible goals, Pelmeare created a "big block" V-8 engine (similar to a Ford Mustang's) that runs on ethanol. He also developed a proprietary hybrid function that uses ceramic magnets in and around the cylinders to power the car. When the engine needs the full 400 hp, the control system makes the V-8 run as a traditional all-ethanol motor and fires up all eight cylinders. When torque demands fade,

the magnets power the car, drastically lowering fuel consumption.

The Verde won't be cheap—it'll have a starting price of \$180,000—but that's far more cost-effective than, say, a Lamborghini, which sells for a minimum of \$250,000 and is expensive to maintain. "That Gallardo's clutch will run \$16,800 to repair," says Collorafi. "Ours will be done with domestic vendors and labor and run \$3,200. That's the niche we want to fill."

Still, skeptics point out that cars with price tags north of \$100,000 make up maybe 0.5% of the global market, with total sales of around \$10 billion. And this market is already crowded with some of the best-known brands in the business, including Bugatti, Ferrari and Rolls-Royce.

Also, doubters wonder how Revenge Designs and HP2g can achieve high levels of power and fuel economy in a mass-produced car—a trick that major automakers have never managed to pull off. Martin Lydell, founder of Lydell Industries, a Jamestown, N.Y. mechanical research firm, notes that Ford, GM and Toyota have spent billions on attempts to increase fuel efficiency in high-performance engines—to no avail. "These wonder engines never work out once they come out of a factory and get serviced," Lydell says.

But Pelmeur and Collorafi aren't worried. They argue that the auto industry has hardly been a model of innovation. And given the right investment, they believe their cutting-edge concepts can be mass-produced. In fact, the two plan a 2012 launch of a four-door sedan that will cost roughly \$60,000, broadening their market reach. Plus, they know there's plenty of room for innovation in the luxury car market. "Luxe car buyers are not just looking for the wow factor," says Tom DuPont, founder of

DuPont Publishing, a St. Petersburg-based luxury marketing firm. "They're looking for the breakthrough factor. If these guys can get this car to work as advertised, they have a real shot."

## COPS AND ROBBERS

**This Indiana startup wants to build the ultimate police car.**

**CARBON MOTORS CONSIDERS ITSELF A LAW-ENFORCEMENT** firm rather than a car manufacturer. "The similarities between us and the automotive industry end with four wheels and an engine," says Stacy Stephens, 38, a former police officer who co-founded the Connersville, Ind.-based firm in 2003 to build high-tech police cars. "We are developing a tool for our law-enforcement first responders."

For decades Detroit paid secondary vendors to turn traditional sedans, such as the Ford Crown Victoria, into police cruisers by adding sirens, computers that access police databases, backseat restraining systems and so on. Carbon Motors' fully functional prototype, the E7, is a reimagining of the retrofitted crime fighter.

To develop his deluxe cop car, Stephens surveyed more than 3,500 officers, information technology specialists and municipal fleet managers from 200 police departments. Their responses were surprisingly consistent: They wanted a tough, fuel-efficient car with easily replaceable parts and a computer system that could be integrated with their existing IT infrastructure. The officers also loved the "cop-car look," saying it helped them appear authoritative but not threatening.

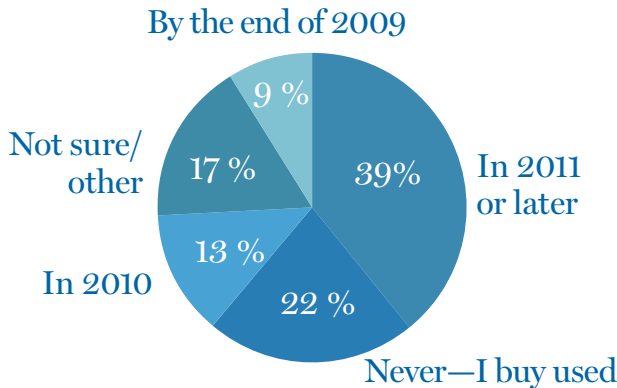
"The similarities between us and the automotive industry end with four wheels and an engine."

—STACY STEPHENS, CARBON MOTORS

Need for Speed: The E7 can go from zero to 60 mph in about six seconds.



## When do you plan to buy a new car, if at all?\*



Stephens integrated all those specs into a 300-hp vehicle that has a plastic body over an aluminum frame and can go from zero to 60 mph in roughly six seconds. As of October 2009, the Carbon Motors E7 existed only in the form of a working prototype touring law-enforcement agencies across the U.S. Stephens claims 12,000 advance orders from a number of state and federal agencies and wants Carbon to be the dominant vendor in the \$4 billion police-vehicle market. He adds that the E7 will be competitively priced among patrol-rated police cars, which typically cost between \$40,000 and \$70,000. Although he would not disclose company revenues, he says Carbon has moved to a new manufacturing facility in southeastern Indiana, where production of 150 more test vehicles is under way. Full production is expected to begin in 2012.

Still, Carbon Motors has its work cut out for it. The company has seen no benefits from federal stimulus spending, although it has applied for \$310 million in low-interest loans from the Department of Energy. Worse, potential customers—its only potential customers, in fact—are cash-strapped local, state and federal law-enforcement agencies. Analysts say these agencies tend to buy in small numbers and stick to brands they know. “They like things that work because they have worked before,” says Kevin Plexico, senior vice president for Input, a research firm in Reston, Va. that specializes in government-sector commerce. “They don’t want to be in the local paper as the fellow who should have known better but didn’t.”

Stephens plans to outperform his competitors via Internet ordering, direct factory support and from-scratch customization. “If we built the E7 like a traditional automaker, it would never be profitable,” he says. “That’s why we did a purpose-built vehicle that ships directly to the customer.”

## THE GAME-CHANGER

A rocket scientist reinvents the car engine.

YOU COULD SAY ROBERTO VELOZZI HAS AUTOMOTIVE BLOOD. Growing up in El Salvador, he was forever doodling futuristic cars in his notebooks; his father even owned a Mercedes-Benz

dealership. But rather than enter the family business, Velozzi, 38, earned a material science degree at UCLA. After graduation he landed a job at the Jet Propulsion Lab in Pasadena, where he worked on direct-methanol fuel-cell technology and continued to dream up concepts for alternative vehicles in his spare time.

By 2007 he was ready to go public with his ideas, most notably a plug-in hybrid featuring a turbine engine that burns just about anything: gasoline, diesel, biodiesel, methanol, ethanol and, with some modification, natural gas. After giving a radio interview about his work, Velozzi was contacted by Germany-based Bayer AG. The pharmaceutical company has an automotive division in Auburn Hills, Mich. that supplies plastics for most GM and Ford vehicles. In Velozzi, Bayer found a potential partner who could help them promote their latest advances in lightweight, state-of-the-art automotive plastics. “We work with Velozzi to show the potential of our technology,” says David Loren, manager of Bayer’s alternative-energy vehicle division.

The Bayer partnership gave Velozzi leverage to forge similar relationships with other automotive suppliers, including Ashland and Montreal-based Nanoledge. While he declined to reveal his total investment to date, he estimates that his approach has saved 50% of the expense of a traditional car prototype, which can run \$3 million to \$4 million. “We are very proud to work on this project,” says Benoit Balmana, managing director of Nanoledge. “Velozzi was able to put together the right automakers to get vehicles off the ground. He has built a very impressive group.”

Velozzi and his confederacy of car parts makers currently have two autos in development. The Velozzi is a street-legal, 770-hp, two-door sports car able to go from zero to 60 in less than three seconds, with a top speed of about 200 mph. The Solo is a more mainstream hybrid-electric crossover that will reach 130 mph, fetch 100 mpg and go from zero to 60 in about six seconds, Velozzi claims. Both cars will use a 50-pound microturbine multi-fuel engine based on Velozzi’s concepts. Both cars will also feature parts that are 40% lighter and more durable—from Bayer and Velozzi’s other partners—than those of similar cars. Prototypes for both vehicles are expected to ship in the second quarter of 2010, according to the company and several of its suppliers.

The Velozzi is expected to cost from \$700,000 to \$1.3 million per vehicle, while the Solo will be a lot more affordable, roughly \$40,000. Despite the entrepreneur’s proven knack for partnering with mainstream carmakers, analysts say Velozzi will be subject to the same pressures that have hobbled the current car industry: decades-old manufacturing plants, management and labor friction, and complex international supply chains that sap efficiency—plus an insatiable desire for capital.

“This is such a capital-intensive business that it’s tough for smaller names to succeed,” says Rebecca Lindland, director of industry research at IHS Global Insight, a research firm in Lexington, Mass. “This doesn’t necessarily mean that smaller companies won’t succeed if they have serious capital behind them, like Hyundai had with Hyundai Group back in 1986.”

Naturally, Velozzi and his partners disagree. “There is too much going on for it not to happen,” says John Beatz, product manager at Ashland, which supplied specialty adhesives and other attachment technologies to the consortium. “If we didn’t think so, we wouldn’t be wasting our time.” □