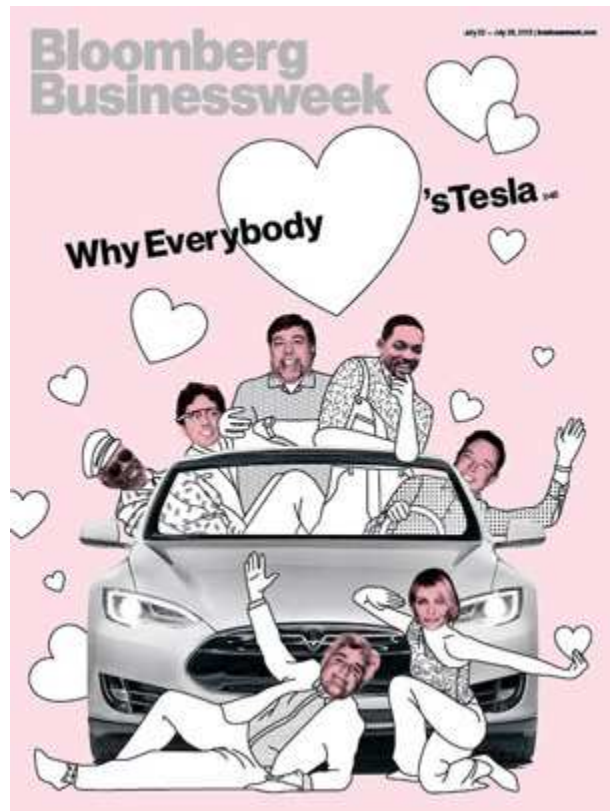


Bloomberg Businessweek**Innovation & Design**<http://www.businessweek.com/articles/2013-07-18/the-tesla-electric-cars-creators-chase-their-iphone-moment>

Why Everybody Loves Tesla

By [Ashlee Vance](#) July 18, 2013

[Click the image to see how the cover got made.](#) The Tesla

Motors ([TSLA](#)) design studio in Los Angeles is a huge open space that usually has a couple of prototype cars on the floor and parts scattered along the walls. Tonight, it's a lounge, with red lighting, white leather couches dotting tiered plateaus of AstroTurf, Daft Punk on the sound system, and women in little black dresses serving cocktails. A few hundred guests mingle and snap photos. Most are local owners of the Model S, the luxury sedan Tesla introduced last year to near-universal acclaim.

The crowd parts for the star of the evening, Elon Musk, Tesla's chief executive officer, and closes behind him as he works the room. After about an hour, Musk, wearing a black velvet jacket, hops onto a stage outfitted with the kind of wheel guides and drive-over repair pit you'd see at a Jiffy Lube. He tells them they're about to witness history: a refueling contest between gasoline and electricity. "You're here for the title fight!" he says.

A \$70,000 Model S rolls onstage and stops over the pit. Simultaneously a live video feed of an Audi ([NSU:GR](#)) entering a gas station appears on a big screen. An on-screen timer starts, and the Audi driver begins pumping gas while robot arms beneath the stage replace the battery pack on the Model S. After 93 seconds, the Tesla rolls off the stage; the Audi is still refueling. A second Model S stops over the pit and finishes its battery swap after 91 seconds—just as the Audi tops off at 20 gallons. "There are people that take

a lot of convincing,” Musk tells the adoring audience. “Hopefully, this is what will finally convince people that electric cars are the future.”

To combat “range anxiety”—the fear of running out of juice—Tesla has announced a rapid expansion of its network of charging stations. To allay concerns that electrics are too expensive, the company has also announced a leasing option and plans to begin production of two cheaper models in the next couple of years. For those worried about resale values should electric cars prove a fad, Musk has pledged his \$5 billion-plus fortune to guarantee the value of the Model S. (Musk declined to be interviewed for this story.)

Wall Street needed assurances, too. In Tesla’s 10 years of existence, the company has suffered through embarrassing delays and leadership overhauls, verged on bankruptcy at least once, and been a favorite target of short sellers. In May it posted its first profitable quarter, with earnings of \$11.2 million; sales for the first quarter rose 83 percent, to \$562 million. Musk raised the 2013 sales estimate by a thousand vehicles to 21,000, an eightfold increase over 2012. A few weeks later, Tesla paid off a \$465 million government loan early and then raised \$1 billion from investors. The stock price has soared in the past six months, from \$32 a share to \$129.90 on July 15, before falling \$18.21 in one day after Goldman Sachs ([GS](#)) published a skeptical report about the carmaker’s margins. Tesla has a market cap of about \$13 billion, or about the size of Mazda Motor, which, according to a Bank of America Merrill Lynch ([BAC](#)) estimate, will sell about 1.3 million vehicles globally in 2013.



Courtesy of TeslaThe extra trunk up front is called a “frunk”

Some of the stock’s rise may have come from short sellers covering their bets, but you don’t get revenue increases like that without a decent product. The Model S does zero to 60 miles per hour in 4.2 seconds, has plenty of room (including a “frunk,” a second trunk under the hood), and gets the energy usage equivalent of 95 miles per gallon. Last November it became the first electric to win the *Motor Trend* Car of the Year award; in May, *Consumer Reports* gave the Model S its highest car rating ever—99 out of 100. “It’s what Marty McFly might have brought back in place of his DeLorean in *Back to the Future*,” the magazine said.

After the battery-pack demonstration, Tesla’s chief designer, Franz von Holzhausen, can barely contain himself as he talks about the design of the Model S. “It’s like the leap of faith Apple ([AAPL](#)) took with the iPhone,” he says, explaining why the car has a touchscreen instead of the usual physical buttons. “There’s a cleanliness to the interior. The screen is the hero. We are in the midst of that transition toward a new way of thinking. For me, it’s that iPhone moment.”



Courtesy of
TeslaA 17-inch touchscreen instead of knobs and buttons

That the company has come this far is no small achievement. But the next phase of Tesla's growth is going to be exponentially more challenging. Tesla's ambition isn't merely to win the title of hottest car in Silicon Valley, it's to simultaneously become the next Ford Motor ([F](#)) and ExxonMobil ([XOM](#))—to be a profitable, mass-scale manufacturer and fuel distribution network. Not even Henry Ford tried to pull all that off.

In terms of nerd magnetism, nothing on the road compares to the Model S, with the possible exception of the Google ([GOOG](#)) Self-Driving Car. (On Highway 101 between San Francisco and Silicon Valley, it's common to see both.) There's the novelty of the electric drivetrain, and the 17-inch touchscreen lets the driver pull up massive, full-screen maps or open the sunroof with a finger swipe. The car alerts drivers when they're near a charging station and can be programmed to recharge at home during cheaper, off-peak hours. The outside handles retract flush into the door when not in use. And, like any hot gadget these days, the car has apps. In an online forum, an owner in Illinois asks for a software update to the remote climate-control system so he can override a timed shutoff and keep his dog cool while going to lunch. Someone else has written an app that pairs Google Glass with a Model S, letting an owner who's forgotten where he parked see the vehicle on a map while its headlights flash.

Even the flaws of the Model S seem to resonate with geeks. Early versions of the outside handles malfunctioned—they sometimes wouldn't extend out of the door—and the windshield wipers seemed to have a mind of their own. Tesla fixed those and other problems with a software upgrade delivered via the car's high-speed wireless connection. "It's part of being an early adopter," says Konstantin Othmer, a Silicon Valley entrepreneur and one of the first Model S buyers.



Courtesy of TeslaThe door handles pop out and smoothly

retract on command

Following Tesla's lead, General Motors ([GM](#)) and Ford have started hiring software developers by the hundreds, in GM's case quadrupling its technology department. The carmakers see kids opting to watch movies on their iPads instead of on pricey, built-in infotainment systems, and know they need to find a way to keep up. "Software is in many ways the heart of the new vehicle experience," says TJ Giuli, a research lab leader at Ford. "From the powertrain to the warning chimes in the car, you're using software to create an expressive and pleasing environment."

Giuli used to teach classes on the automobile user experience to computer science students at the University of Michigan. Now he wears Silicon Valley-regulation sandals, has a ponytail, and works out of a small office in Palo Alto, where Ford has created a research lab. The space has primary-color decor, a workroom with 3D printers and metal-bending tools, and hosts monthly hackathons. At a recent event, engineers outfitted a radio-controlled toy car with a webcam and a gun that can fire 40 rounds of Nerf ammo.

Giuli says he's envious of what Tesla has achieved by starting from scratch and interweaving software on the touchscreen with the vehicle's internal systems. "The level of integration that the software has into the rest of the Model S is really impressive," he says. "Tesla is a benchmark for what we do here." Giuli hastens to add that Ford is putting very good, affordable software into millions of cars. It's a not-so-subtle reminder of how far Tesla still has to go.

The conventional wisdom around electric cars is that they're a wonderful way to lose money. While Tesla has finally turned a profit, its rivals are suffering. In April, Fisker Automotive laid off 75 percent of its staff and hired consultants to explore a possible bankruptcy and sale. Its remaining employees and top executives are in limbo. They have a gorgeous car, the Atlantic, designed and ready, and no one to finance its production. "I still hope and believe and pray we will be able to do this," says Alexander Klatt, vice president of global design for Fisker and a former designer at BMW ([BMW:GR](#)).

Fisker had raised more than \$1.2 billion in private funds, according to company filings, and received \$192 million in a loan from the U.S. Department of Energy. Its undoing came in part from fumbling as it rushed to meet deadlines set by the government. The company, based in Anaheim, Calif., spent heavily on a hiring binge and relied on a network of pricey contractors and suppliers. As happened initially with Tesla's first car, the Roadster, Fisker lost money on its first model. Unlike Tesla, though, Fisker ran out of cash before it could rein in costs and establish tighter controls. (Musk sank more of his fortune into Tesla when it ran into trouble, and got an infusion of venture capital from Draper Fisher Jurvetson, among other investors.) "You see the stock price for Tesla, and it makes us very envious," Klatt says. "It makes you think about what we did wrong and what we need to learn from Elon and their team."

In May, just before Tesla's battery-swap announcement, a startup with that same idea went under. Better Place plowed about \$1 billion into a quest to build a global network of battery-swapping stations, beginning in

Israel. Carmakers, however, were reluctant to adopt the underlying technology needed to make Better Place's stations work, and the company spent too much money trying to expand quickly. A group of investors have since acquired its assets for about \$12 million.

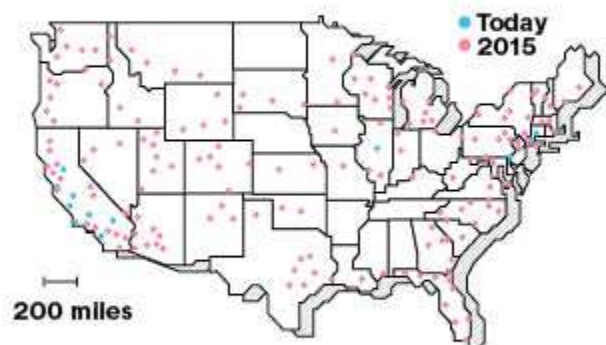
If there's a secret to Tesla's success, it's been to outsource as little as possible. The company has insisted on doing just about everything it can in-house, which has helped it develop intellectual property and control costs. Tesla built the battery pack replacement feature into the Model S, for example, and then designed the robots that will do the work.

Early on, Tesla had a team of about a half-dozen people building a prototype car in an industrial office space turned into a mini-factory. None of the engineers came from the auto industry; they were largely solar-powered car hobbyists and gadget makers. A key decision by the founding crew was to lash together thousands of the lithium ion batteries found in laptops to form a giant battery pack. The solution wasn't elegant, but it capitalized on reliable, cheap batteries already on the market. "Even today, the other car companies will buy custom batteries that are so-called automotive grade, and the costs go through the roof," says Gene Berdichevsky, an early Tesla employee. "For us, the lithium ion batteries became a commodity."

The trick was getting all those batteries to work together safely. "If one exploded and the fire went to the next one, Tesla would have been done," says Berdichevsky. Tesla's early employees spent their evenings testing the batteries' thermal properties by blowing them up. Eventually the engineers hit on a design, which remains secret, that gives each battery a buffer zone and liquid cooling that isolates it from the others.

While Tesla was figuring out how to keep its cars from exploding, it also had to come up with ways to get them to go farther and recharge faster. Higher-end versions of the Model S can go up to 300 miles on a charge, which has helped separate Tesla from rival vehicles such as the Nissan Leaf, which run about 75 miles before needing more juice. Musk has hinted that Tesla has a 500-mile battery pack in the works. At the company's solar-powered Supercharger stations, Tesla owners can replenish about 200 miles of range in 20 minutes for free. (Most electric cars take hours to recharge.) Or customers can opt for the battery swap, which will cost about what they'd pay for a tank of gas, and be back on the road in 90 seconds. "The only decision that you have to make when you come to one of our Tesla stations is do you prefer faster or free," Musk said at the charging event. The company expects to have 100 stations along major highways in the U.S. and Canada by yearend, with more to follow.

Tesla's U.S. Charging Station Network



GRAPHIC BY BLOOMBERG BUSINESSWEEK
DATA: TESLA

Unlike every other major car company, Tesla has also kept its retail business in-house. It's trying the Apple

model of placing its own stores in high-end malls and shopping centers instead of relying on dealer franchises. Salespeople, who don't receive commissions, help buyers configure their cars on giant touchscreens. The company has created an unusual financing program meant to assure buyers that their Tesla will retain its value when they sell it. If you buy a car through Tesla's financing program, you get a guaranteed option to sell it back to the company at a price pegged to a comparable BMW, Mercedes, Audi, or Lexus. Should something go wrong with your car, Tesla will send a concierge with a new Model S loaner, repair your car, and return it. Tesla recommends the Model S be brought in once a year for servicing. The warranty is still valid if you don't.

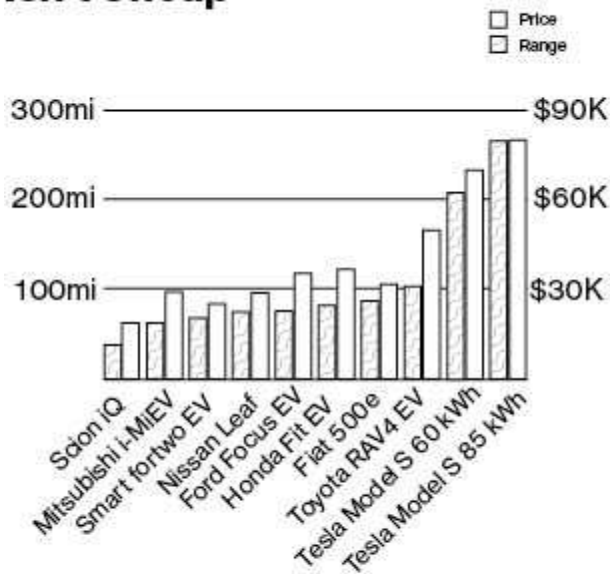
Musk has desks all over California. He's the CEO of SpaceX, based near L.A., which builds rockets for companies and countries to get satellites into space, and the chairman of San Mateo-based SolarCity, which installs solar panels. At Tesla, he has a desk at the company's headquarters in Palo Alto and another in a cluster on the factory floor in Fremont. His is the one with the *Motor Trend* "Golden Calipers" trophy.

The previous occupant of the 5.5 million-square-foot factory was New United Motor Manufacturing, the Toyota Motor-GM joint venture that made Geo Prizms and Pontiac Vibes. Tesla acquired the facility for \$42 million in 2010. One of the first things Tesla did after moving in was to whitewash the plant and put its dagger-like "T" logo all over the place. A year ago the plant was lucky to produce five Model S sedans a week. Capacity increased as production kinks were worked out, and today the factory can churn out 500.

Tesla recently initiated a voluntary recall of a few hundred vehicles after deciding that the welding near one of the seats wasn't quite right. Its share price rose despite the news, presumably because some Wall Street analysts expect Musk to raise his sales forecast for the Model S again as the cars start appearing in Europe and Asia. Jefferies ([LUK](#)) recently raised its price target for Tesla shares from \$70 to \$130. Musk has promised Porsche-like gross margins of 25 percent in the years ahead, but some analysts are dubious he'll be able to get much more than the 17 percent the company earns now. Goldman Sachs's July 15 report set a price target of \$84 a share.

Musk's plan all along has been to extend the company's product line with lower-priced models while increasing production at the factory. Arriving next year is the Model X, an SUV-minivan combo that will seat seven adults and probably sell in the \$40,000 range. Following that, the company plans to deliver a sedan priced at about \$35,000. The biggest concern among investors, though, is that the Model X and the new sedan won't be cheap enough to attract regular buyers.

Reducing Range Anxiety Isn't Cheap



GRAPHIC BY BLOOMBERG BUSINESSWEEK
DATA: US DEPARTMENT OF ENERGY

One way for Tesla to get cheaper is to surrender a little control. “They will have to enter into parts-sharing agreements for basic things like lights and switches if they want to really compete on cost with companies building 400,000 vehicles,” says Rich Munley, an attorney in Detroit who has spent years working with auto companies, including GM and Fisker. “It’s just too expensive to build your own tool to stamp out individual parts.” Tesla will offset some of those costs by selling electric powertrains to Toyota ([TM](#)) and Daimler ([DAI:GR](#)). That business is growing, but still small—it accounted for 3 percent of revenue last quarter. “When it comes to manufacturing, Detroit is much farther down the learning curve,” says Willy Shih, a professor at Harvard Business School. Shih says he’s skeptical of electric cars in general, and of Tesla’s chances of building the infrastructure it needs to support the charging and battery-swap systems, because so many pieces of the Tesla equation rely on immature technology. “As a result, they’re at the expensive end of so much new technology,” Shih says. “It’s a very costly and challenging proposition.”

There’s also the possibility that Tesla is overdoing it with the high-tech whiz-bang. The 17-inch touchscreen, for example, is equipped with a Web browser. Distracted driving laws vary by state, but obviously no one behind the wheel should type out Internet searches in a moving vehicle. There’s no stopping determined drivers from trying. Tesla’s in-car technology “is almost too good,” says Munley. “Detroit is leery about it, and would never go that way for fear of safety and lawsuits. We’re all waiting to see if there are accidents.” Meanwhile, car dealers around the country see Tesla’s direct-to-consumer sales as a violation of laws that separate car manufacturing from selling, and are engaged in a statehouse-by-statehouse lobbying effort to block the company from opening its own stores. (Dealers tend to make most of their money from servicing vehicles, and electric cars do not require much maintenance.)

There’s no guarantee Tesla can keep growing the way it has, but it’s already invigorated Silicon Valley in a way that Detroit cannot ignore. Former Tesla employees have broken off to create electric motorcycle and electric delivery-truck companies. Others have developed apps that help people find electric charging stations, while Berdichevsky has created a startup to advance battery technology. Venture capital firms have begun backing companies that build all-electric buses, as well as dozens of auto-related software startups,

including mapping company Waze, which Google just bought for \$1 billion. And Google has those self-driving cars.

“Cars were the last unconnected devices,” says Aaron Platshon, a former Tesla employee who went on to found an auto-sharing startup. “Now they’re coming online and opening up a huge number of opportunities.” Platshon grew up in Silicon Valley and used to work on old cars with his dad. “Historically, it’s been next to impossible to marry a passion of cars with a career in the technology industry,” he says. “Now Tesla has made cars relevant in a modern way, and I think it’s time for the next big iteration on how we think about vehicles.”

Tesla must perform that delicate dance of staying cool while trying to build its brand beyond the West Coast. It won’t break down sales by state, though the company has opened multiple stores in New York, Texas, Illinois, and Florida, and says about three-quarters of revenue comes from outside California. Its next test will come later this year when the Model S goes on sale in Europe and Asia. Investors will be watching closely to see whether Germans and Chinese take to the car the way wealthy American geeks and eco-absolutists have—and if they do, how well that Fremont factory holds up under the stress.

Musk is certain how he thinks all this will play out. At the refueling event, a massive screen entertained the crowd with old commercials for various gas companies—Bob Hope at a Texaco station, the Esso tiger bragging about higher octane. “Gas is a weird thing to love,” Musk said.



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