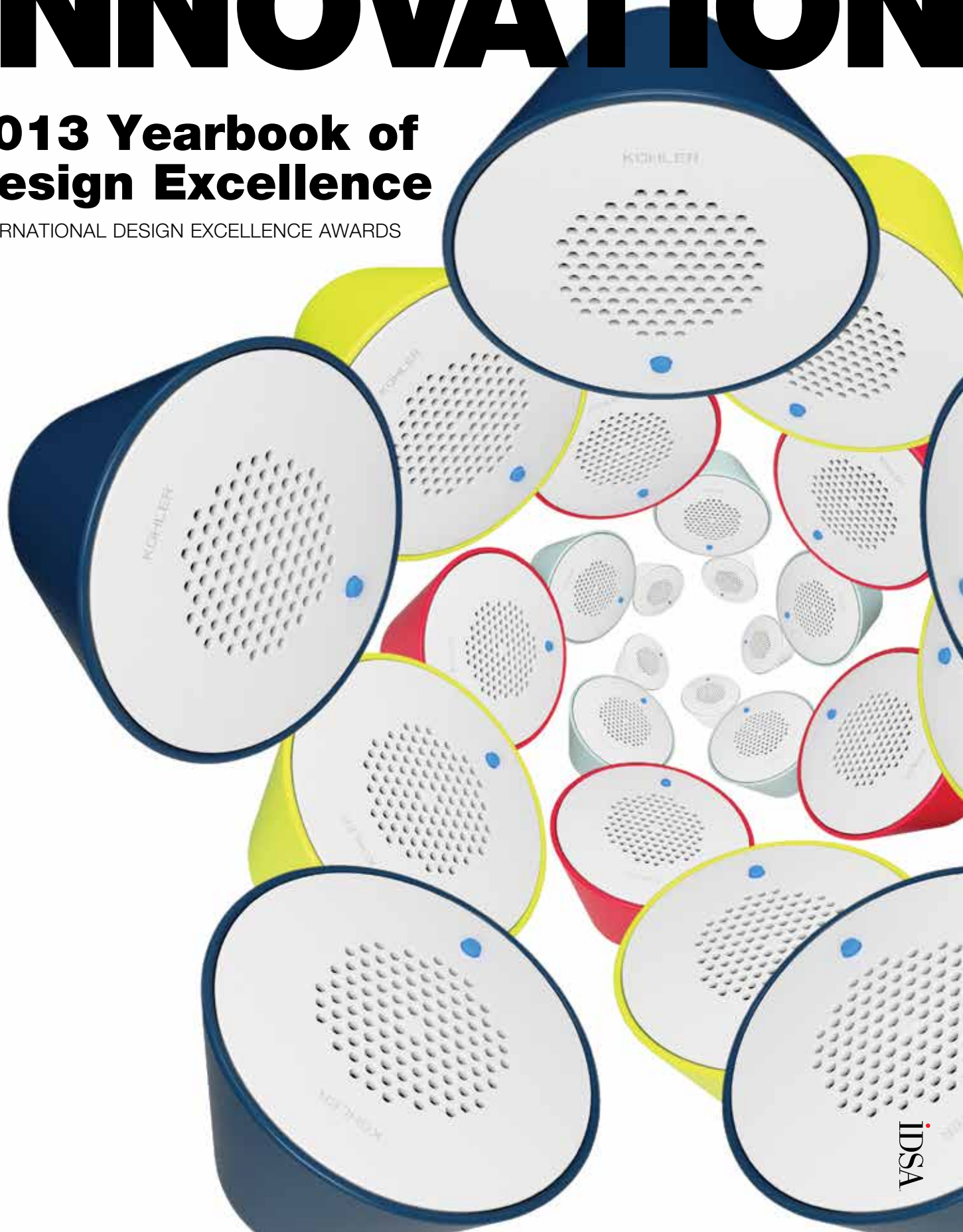


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—Torsten Fritze, Studio & Partners



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**Far Left:** Nokia Colour and Materials Design Strategy, p. 82.

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Above: "Who Are We?" p. 91.

BEST IN SHOW

TRANSPORTATION

By Lydia Bjornlund, *Innovation* contributing writer

Tesla Model S

# GREEN WITH ENVY



**W**ith the introduction of the Tesla Roadster in 2008, Tesla Motors had established a reputation as an innovator. But CEO Elon Musk was committed to exceeding this reputation. He set out to design a car that would not only be the best electric car on the market but the best car on the market, period.

The challenge was to build an electric sedan that would rival the best cars on the road. It had to be beautiful. It had to be safe. It had to deliver uncompromised performance on the highway and byway. Above all, it had to overcome one major obstacle: range. The Tesla Model S design team knew that extending the range was essential to winning over American consumers. This meant the design would have to accommodate a battery large enough to take folks where they want to go.

The architecture of a traditional car made these goals impossible. Placing the battery at the front or rear of the car would compromise the distribution of weight and would negatively impact both performance and efficiency. The designers needed to build the electric car from the ground up.

Looking at the car's design in a new way, the team began to see the battery not as an obstacle but as an opportunity. Focusing on the unique needs of an electric-powered vehicle, Tesla designed an entirely new architecture around the powertrain, with the battery pack flat under the floor and the motor and gearbox between the wheels. This gives the Model S a rigid body structure, low center of gravity and nearly 50/50 weight distribution. When combined, these factors add up to superior handling that drivers



expect from the world's best sports cars with the smooth, comfortable ride of a luxury sedan.

#### **Lightweight and Lean**

The elegant-yet-aggressive design rivals any high-end sports car. "[The] Model S epitomizes efficiency, embodying the grace and performance of a world-class athlete," said Franz von Holzhausen, Tesla's chief designer. "Its sculpted form expresses a constant state of speed and motion." But the sleek design does more than look good, it improves aerodynamics to reduce wind resistance to an impressive drag coefficient of just 0.24. Improving the aerodynamics was achieved through single-minded attention on everything from the car's sleek form to apparently innocuous details like door handles, which retract into the body and slide out in James Bond-like fashion when the driver approaches the vehicle with the key.



The body of the Model S is made of stamped aluminum, which helps to keep the weight to a minimum. Hollow-cast front knuckles weigh 25 percent less than a conventional knuckle of similar strength, while extruded rear suspension links provide the strength of forgings at a much lower cost. Extrusions, stampings and castings are expertly joined for rigidity and strength, providing safety and maneuverability.

Tesla's advanced electric powertrain delivers exhilarating performance. Compared to the internal combustion engine with hundreds of moving pieces that spark and grind, the Tesla motor has just one moving piece: the rotor. This means almost instant acceleration, taking the Model S from 0 to 60 mph in less than five seconds.

Like other luxury sedans, the Tesla Model S cabin offers plenty of legroom. Unlike most, it also offers the option of third-row seating. The design team took advantage of the lack of an engine under the hood to repurpose this space as a second trunk, which Tesla calls a "frunk." Combined this provides 63.4 cubic feet of storage space, almost as much as a Chevy Equinox.

The crowning jewel of the interior is a 17-inch touch screen with an intuitive interface that controls everything from lighting and the state-of-the-art sound system to the car's steering, which can be switched from comfortable to sporty at the tap of a finger. The navigation screen also offers Google-style search functionality. Type in a destination and convert the results into turn-by-turn navigation guidance. Want to open the panoramic sunroof? Bring up an overhead image of the car on the touch screen and simply drag back the panoramic roof as far as you'd like—all the way for a convertible-like experience. The Model S also tracks the car's efficiency and displays it on the touch screen so drivers know exactly when they need to power up.

The Model S is getting high praise for its quiet ride. *Consumer Reports* proclaims it to be the quietest vehicle the magazine has ever tested. Tesla has combined noise engineering with a uniquely quiet powertrain to obtain recording studio-quality sound dynamics. And if you are looking for an extra boost, the controls go to 11 (a playful nod to Rob Reiner's rock music mockumentary *This Is Spinal Tap*).

The Model S suspension system was specifically developed for the unique architecture of the Model S. The suspension design went through hundreds of iterations as the vehicle dynamics team tweaked each detail to achieve a solution that would simultaneously improve performance,





comfort and efficiency. The solution includes upgraded dampers, bushings and stabilizer bars. Unencumbered by an engine, the lightweight front suspension optimizes wheel control; the rear multilink suspension is designed to integrate seamlessly with the powertrain. As the Model S accelerates, the suspension lowers the vehicle for optimized aerodynamics and increased range. The touch screen enables the driver to raise the Model S to drive through snow or pull into a steep driveway.

No discussion of an electric vehicle would be complete without pointing out the obvious: zero emissions. Owners won't miss the tailpipe, which has been replaced with a charging port discretely hidden behind the tail light. A full charge takes about six hours from an ordinary 240-volt outlet. With the Tesla Supercharger, a 50 percent charge can be achieved in just 30 minutes.

The Model S is offered with three battery options, so consumers can select the one that accommodates their needs—or their wallet. The largest, 85-kilowatt-hour powertrain delivers an EPA-certified range of 265 miles. All three batteries are contained within the same enclosure and integrate with the vehicle in the same way. Automotive-grade lithium-ion cells provide optimum energy density, thermal management and safety. Liquid-cooled, the battery maintains consistent temperatures to prevent cells from overheating. In the event of a crash, the battery structure protects cells from impact and the power supply is automatically disconnected.

## The Future Is a Long Journey of Change

In its deliberations to select the Best in Show, the IDEA jury debated the merits of each Gold award winner in search of a product that would be seen as a positive beacon for the future—a product that could significantly influence consumer perceptions and buying behavior.

As a voice for the industrial design profession, the IDEA jury also wanted to recognize and encourage industrial progress toward environmentally sustainable product solutions.

This spring saw carbon dioxide levels in the atmosphere reach a landmark high, leading to renewed calls for governments to stimulate changes to the way society consumes energy. The design, technology and business communities have a key role to play in this initiative, as their actions today will define consumer choices tomorrow.

Consumers tend to become interested in purchasing proven technologies only when they are packaged into desirable product solutions. The Tesla Model S is just the beginning of a journey to change consumer perceptions of electrically powered personal commuting. By creating a desirable and viable alternative to gasoline-powered transportation, Tesla has proven that being environmentally responsible does not have to limit the aspiration for desirable product solutions.

The price point for the Tesla Model S is high, but the company has an ambitious strategy to compete in the high end of the market, where customers are prepared to pay for premium. This is combined with a longer-term goal to reduce unit costs with each successive model through economies of scale, thereby democratizing the technology.

As the IDEA jury sat in The Henry Ford Museum, an institution dedicated to celebrating industrial innovation, it seemed fitting to give this award to the Tesla Model S in the hope that it will inspire not only the automotive industry but all industries to invest in and develop environmentally sustainable product solutions that consumers truly want to own and will enjoy using.

—Roger Swales, *GRO design*  
on behalf of the 2013 jury

“A bold example of how design can help sell a grand vision

Safety is further enhanced through the placement of the powertrain. Double-octagonal rails run along the bottom of the structure and are designed to absorb impact in an accident. High-strength steel is used in key areas to enhance occupant safety.

### Innovation at Its Core

Designing a car from the ground up required innovation at every step of the way. Tesla claims more than 250 patents on the Model S with additional patents pending.

The originality has not gone unnoticed. Since it entered the scene, the Model S has attracted unprecedented attention from auto enthusiasts. It has been named *Automobile* magazine's 2013 Automobile of the Year and *Motor Trend's* 2013 Car of the Year. *Consumer Reports* gave it a 99 out of a possible 100 points, calling it the best car it has ever tested. So what cost the Model S that extra point? The need to stop to recharge. "If it could recharge in any gas station in three minutes, this car would score about 110," said Jake Fisher, head of *Consumer Reports'* auto testing division.

Even with the \$7,500 tax credit from the federal government, the Tesla Model S is pricy, with the 85-kilowatt-hour option having a base price of \$62,400. Still, the price has come down significantly from Tesla's last model: In 2008, the Tesla Roadster reached the market at \$109,000.

Hand in hand with the design of the Model S came an aggressive marketing strategy intended to attract high-end consumers. Rather than advertising the car as an eco-friendly alternative that will save gas money, Tesla has positioned the Model S as a luxury vehicle with superior performance and styling. Early results suggest that the marketing strategy is paying off. In the first quarter of 2013 the Model S outsold similarly priced BMW and Mercedes models and helped Tesla turn a profit for the first time.

No single new model can overhaul the auto industry, but the Tesla Model S has changed the name of the game. Eco-friendly, functional and attractive, the Model S is a vehicle any driver would be proud to own. The Model S has turned green into gold. ■

Designed by Franz von Holzhausen of **Tesla Motors**



for the future. Detroit may not have wanted to go there,  
but entrepreneurship and design did—and in the process proved there was a market for challenging the status quo.”

—Tad Toulis, IDSA, Teague





## Sonos SUB

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