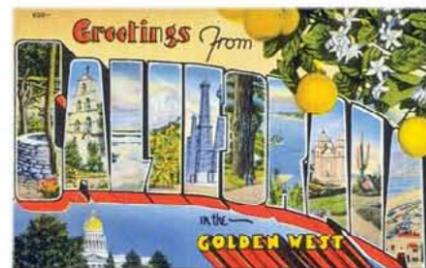


# LIGHTER, SMOOTHER, ZOOMIER

THE FUEL EFFICIENT NEW  
MAZDA3 SKYACTIV

BY JOE SAGE



**T**here is much new with the Mazda3 for 2012. For starters, it's been lightly restyled. "It's not quite as happy to see you," says David Matthew, Mazda vehicle line manager for product planning and strategy. The new front fascia has evolved to present a more sporting look, augmented by body-colored finishes in the rear fascia all the way down the line and new 16- and 17-inch aluminum alloy wheels with a canted five-double-spoke design to impart a sense of motion.

The interior is also redone, with new trim finishes and new cloth seating material, plus an updated information display, which now features clean white lettering. Gauge displays are color-keyed by model, with meters receiving neutral illumination on the general lineup, red on the MAZDASPEED3 and blue on SKYACTIV models.

The SKYACTIV model is also recognizable on the exterior by a blue headlight ring and a rear badge, and under the hood by its blue engine cover. (And in many cases, you'll also recognize the Mazda3 SKYACTIV by its distinctive available Sky Blue Metallic Clearcoat paint.

And what is this SKYACTIV we refer to? It is the reason we have traveled to Southern California—a massive undertaking by Mazda to develop a detailed reengineering of their cars starting with a near-blank slate.

### MATCHING THE MARKETPLACE

The SKYACTIV name derives from a multipurpose Japanese phrase suggesting "the sky is the limit" and "open your mind." Positive statements in their own right, they are intended to convey the comprehensive approach taken in this collection of major new engineering feats. Referenced within are a green message, a lifestyle message and a performance message. These comprise the brand's engineering goals, and it doesn't hurt that these dovetail well with their demographic and sales goals.

Mazda North America's VP of sales Ron Stettner points out that the Mazda3 represents one third of the brand's global sales and a full 40 percent in the US. As the company puts supply-chain repercussions of last spring's devastating Fukushima earthquake behind them, they report September year-over-year sales increases of 37 percent overall, including 13 percent for the Mazda3 and 70 percent for their crossovers (the CX-7 and CX-9). They're even more excited about next year.

In the past, the 5-door Mazda3 has been outfitted and marketed differently from the sedan—it has had a bigger engine and attracted a premium buyer. The introduction of their SKYACTIV series creates an opening to broaden these offerings: SKYACTIV technology will be available in both Mazda3 bodies. They expect this to bring new Mazda3 customers in the door. A CX-5



crossover will arrive in 2013, built on essentially the same platform with the same powertrain, but Stettner says sedan and 5-door customers aren't interested in a crossover. What's more, he points out that 40 mpg (as available in the new Mazda3 SKYACTIV sedan with automatic) is great, but 39 mpg in the 5-door hatchback is unmatched by any crossover—so far—and it offers much of the same functionality.

Half of Mazda3 sales in the US are in the Northeast (28 percent) and West (22 percent). Whereas a strong leasing program seems to be a big factor in Northeast sales, Mazda sees the West—where a collapsing real estate bubble has hit Phoenix, Las Vegas and Southern California particularly hard—as a prime market already showing high interest in this stylish and upbeat new car with breakthrough technology and great fuel economy.

Mazda communications director Jeremy Barnes point out that "more Mazdas are road-raced than any other vehicle, on any given weekend." What's more, he adds, they had recently beaten "all the big teams with big engines," and had gone on to receive trophies not only for race wins, but for their combination of "environment, efficiency and performance."

Kenichiro Saruwatari, Mazda executive officer from Japan, points out that 3 million Mazda3s have been sold since 2003, with a rate of 100,000 per year in the US. Those are healthy numbers, but they are looking ahead. The new Mazda3 has to deliver not only fuel efficiency, but excitement in a sport compact package. A solid driver experience is a consistent Mazda goal, so they aimed both to deliver precise driving dynamics (matching driver input) and to eliminate distractions and improve driver concentration. The team's challenge was to determine what must change and what could remain the same.

This process did not happen exclusively in the engineering labs. Mazda sought measurable data, enlisting 17 customers to provide feedback, through normal conditions of both work week and weekend, and both local and distance driving, logging about 282,000 miles total.

### SKYACTIV TECHNOLOGY

SKYACTIV is a brand, a marketing plan, a philosophy and a set of engineering projects, all rolled into one. The engineering projects will permeate the whole brand, but they are not happening all at once. The Mazda3 SKYACTIV, however, delivers a strong head start.

For 2012, the Mazda3 features its new SKYACTIV

KEEP RIGHT >>



"If you want to remove 100 pounds," automotive engineers have long said, "you'll have to find 1600 places to do it." Each ounce counts, and Mazda has made extensive innovations to shave them in their next-generation chassis (above left), the SKYACTIV inline-4 engine (top right), SKYACTIV 6-speed automatic transmission (near right) and next-gen 6-speed manual transmission (far right). Shown below are the old (upper) and new SKYACTIV (lower) crankshaft, piston and connecting rod.



The 2.0-liter SKYACTIV-G gasoline engine in the new Mazda3 SKYACTIV has had every piece reexamined and reengineered, with unified goals of achieving ideal combustion and low weight, which in turn deliver a combination of better fuel economy, lower emissions, higher low and midrange torque, and a light and lively driving response. This potent inline-4 achieves 155 hp at 6000 rpm and 148 lb-ft of torque at 4500. Fuel economy is 28/40 for the sedan with an automatic transmission or 27/39 with manual, while the hatchback hits 28/39 auto and 27/38 manual (city/highway).





gasoline engine, as well as new transmissions (see sidebar). New chassis and body engineering are well along in development (ditto a SKYACTIV diesel engine), but this first model instead improves the chassis by adding a brace bar and crossmember, plus more weld points, resulting in a more rigid body for a more active yet quiet ride. Quietness is also improved through increased steering dampening—overall, road noise is reduced by four percent. Fuel efficiency and driving dynamics are also complemented by a full aerodynamic treatment on the underbody.

The interior of the new Mazda3 is designed to be more integrated as well as sportier. Gone are excessive silver-painted surfaces, replaced by rich blacks and soft-touch materials. The goals were not only cosmetic, but instrumentation and controls were refined with an eye toward lower driver distraction. Results are impressive: drivers tested in the new Mazda3 had response times improved by 0.15 second and made 20 percent fewer errors. This is welcome, as feature-complexity has been doing just the opposite in many new vehicles.

Safety features abound. Any vehicle includes or offers ABS, ESC, brake assist, active headrests and other mandated technologies, but the availability of Blind Spot Monitoring (BSM) in the Mazda3 is a segment exclusive.

#### ZOOMING IN THE MAZDA3

Our test route dished out everything. We started in a Mazda3 SKYACTIV 5-door hatchback on the streets of Hollywood, then headed north, hitting the freeway within a mile or so. Controls were straightforward and cabin visibility was very good in tight traffic. We headed north on US 101 and I-5, crossed over to I-210 south, and exited at Sunland and Tujunga, over the ridge and mountain parks from Burbank and bordering the Angeles National Forest. From here, we hit Big Tujunga Canyon Road, a real winner of a test road, with steep climbs, sharp turns and great scenery to boot (as well as fun tunnels and cliffs, though those weren't really performance factors). Power was ample and steering was crisp. We concentrated on the transmission: our car was equipped with the new SKYACTIV-DRIVE® 6-speed automatic.

Dave Coleman, of Mazda research and development, had told us all about this transmission's benefits. The manual is updated, too, but as Coleman said, there is little room for further development in those; the automatic, though, is "a little more revolutionary." Or a lot.

Coleman pointed out that most people have become resigned to the idiosyncracies of a traditional torque converter automatic, its lurches and gaps, and most notably disconnected feel. Such things were set to be banished in the SKYACTIV program, with an all-new automatic that not only delivers high efficiency (as with all SKYACTIV components, via reductions in weight and friction), but quick, smooth, responsive shifting similar to a manual, with special attention paid to a smooth and powerful launch. Healthy torque is one factor in this, but the transmission's engineering introduces a new trick.

Coleman had compared Mazda's goals with the other three automatic transmission technologies available, pointing out how each falls short in some areas. A dual-clutch automatic is good for efficiency and a connected driver feel, as well as quick, smooth shifting, but falls short on launch and low-speed control, notably on

inclines. CVTs can handle that, but are less efficient at high speeds and short on a connected feel in most cases. A conventional torque converter is adequate at launch and high speeds, but disconnected in feel and response, plus inefficient at lower speeds. The Mazda solution is a hybrid of a different sort, incorporating both a torque converter and clutch (as in DSG), with the torque converter providing optimum launch and speeds to 5 mph, then transitioning smoothly to a clutch for the balance of operations. Redesigned hydraulics provide quick shifting.

In short, we found it effective. Most of our driving was at speed, and the clutch mechanism performed as intended, as we were able to concentrate on a great road and not suffer any shifting oddities. The torque converter came into play at stop signs, a less obvious reason we were given this great route off the highways. Not only is this a neat drivetrain solution from a performance and feel standpoint, but Mazda claims a seven percent boost in fuel economy from the system.

From the high mountain roads, we emerged to the north at Canyon Country, California, midday.

There, Mazda provided a full range of competitors, to sample on a steep and twisty two-lane mountain road. Included were C-segment offerings from Ford, Honda, Hyundai, Chevrolet and others tackling the combination of small size, economical purchase and reduced fuel consumption with new technologies. We had driven all but a couple before, and we gave those a spin this day. Comparisons based on this would not be very definitive, but suffice it to say the Mazda3's main bragging points—spirited handling and a very smooth automatic transmission—came through well. (We also took the 6-speed manual sedan on this run.)

Our return drive was via state highway and freeway, affording an opportunity to prove that you don't have to push the performance and dynamics envelope at all times to enjoy this car—it was a fine highway cruiser, comfortable inside and capable in fast traffic.

#### TRANSFORMATIVE, AFFORDABLE

Many people ask whether—given past-until-very-recent relationships—Ford shares any of these technologies. The answer is no. SKYACTIV technologies were developed solely by Mazda, having no joint development with any other companies. This is Mazda's new crown jewel.

The directive for the SKYACTIV development team at Mazda was to "start with a blank slate, ignore what you think the limitations are, set goals and engineer your way past them." The transformative design that has resulted puts a staggering amount of new technology in your driveway. With fuel consumption down and driving dynamics up, the Mazda3 delivers both green and a grin.

There are ten Mazda3 models (not counting the MAZDASPEED3). The lineup starts at just \$15,200, for a base MZR 2.0-liter engine with 5-speed manual. Three of the ten are SKYACTIVs. There is a SKYACTIV Touring with manual or automatic (at \$18,450 and \$19,300). Our test car was the Mazda3 SKYACTIV Grand Touring model (these are automatic-only). A Technology Package providing BSM, Sirius satellite radio (with 4 months free), perimeter alarm, rain-sensing wipers, auto-leveling bi-xenon headlights, pivoting adaptive front lighting and auto headlights added just \$1400. With destination charge of \$795, the total was \$24,495. ■

