

Ibuki

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- [Concept Vehicle](#) [1]

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[2]

[Mazda Ibuki Concept](#)

[Low Resolution\(24 kb\)](#) [3]

[High Resolution \(1826 kb\)](#) [4]

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- [PDF](#) [8]

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MAZDA IBUKI CONCEPT VEHICLE MAKES NORTH AMERICAN DEBUT AT CHICAGO AUTO SHOW

- Design Concept Hints At Future Generation MX-5 Miata -

CHICAGO - Chicagoans and others will have the opportunity to peek into the legendary past of the Mazda MX-5 Miata, as well as its possible future, when the Mazda Ibuki concept makes its North American debut at the 2004 Chicago Auto Show. The Ibuki suggests one possible approach for a future MX-5 Miata model.

Recognized in the Guinness Book of World Records as the best-selling, two-seat sports car of all time, the Mazda MX-5 Miata re-established for enthusiasts around the world the concept of the lightweight convertible sports car. Launched in 1989, its 15-year legacy lives on in the Ibuki concept, which clearly showcases Mazda's current efforts in both design and technology.

"The aim of this concept was to further refine the fun-to-drive spirit that can be derived from a lightweight, convertible sports car," said Truman Pollard, chief designer of Mazda North American Operations. "At the same time, the design team has worked to advance the true roadster identity and further refine the levels of comfort and safety in a vehicle with the top down."

In an effort to more fully realize oneness between car and driver—a oneness that was the overall intent of the original MX-5 Miata—the Ibuki design team has borrowed from the advanced front-midship engine layout of Mazda RX-8, although in this case employing an inline four-cylinder engine.

Overall vehicle proportions have been defined by extremely short front and rear overhangs that confidently signify the extreme fun-to-drive spirit achieved by the innovative engine layout. The overall shape is clean and simple, reminiscent of the original Mazda MX-5 Miata, with a wide and stable stance, pronounced fenders and the elegant use of oval shapes throughout the design.

Isao Tohda, a key member of the Ibuki development team who also played an important role in the development of Mazda RX-8 says, "We aimed for a sports car that offers the sort of fun felt from being in firm control of one's own driving. With Mazda Ibuki, our primary theme was to minimize the car's yaw inertia moment, and to take Mazda's own sports car values to the absolute extreme."

THE ULTIMATE ROADSTER DESIGN

Mazda Ibuki has an overall length of 143.3 inches, measures 67.7 inches in width, 48.4 in height and rides on a wheelbase of 91.7 inches. The overall length is 12.4 inches shorter than that of the current MX-5 Miata. A key design feature is a 15-inch reduction in the combined front and rear overhang lengths, as compared to the current MX-5 Miata.

With the exterior, Mazda capitalizes on these compact dimensions and the benefits of a twin backbone frame to give concrete support to driving functions. The oval body shape evokes a look of tension in repose, and the 18-inch wheels and run-flat tires accentuate the car's well-planted stance. The body form also communicates the snug yet comfortable fit that both driver and passenger enjoy.

Front and rear views inherit the familiar look of the first-generation MX-5 Miata married to a more futuristic design. The radically curved windscreen conceals the front pillars and gives occupants of the Mazda Ibuki a wide field of view as well as a distinctive character.

"Sports car design is a question of expressing the car's frame, and begins by supporting driving functions," said Moray Callum, director of Mazda's Design Division. "With the Ibuki concept we aimed to visualize, as simply as possible, the car's compact size and the undeniable excellence of its super front-midship layout. The results can be seen in a contemporary design that also manages to evoke the familiarity of the past MX-5 Miata. As we work to develop the future direction of the Roadster, it was very important for the Mazda design team to fully understand and appreciate the original. The purity of the original design is particularly interesting to us."

LIGHTWEIGHT, HIGH-RIGIDITY TWIN BACKBONE BODY STRUCTURE

For Ibuki, Mazda engineers developed a twin backbone body structure. Based on the high-mount backbone frame concept employed with Mazda RX-8, the structure comprises an open body frame with extensive reinforcements and a rigid lower backbone frame located beneath the transmission tunnel. This unique construction, featuring upper and lower backbone frames, helps the Ibuki concept achieve extremely high rigidity—a level of stiffness comparable to that of a closed body structure—while maintaining the extremely low weight demanded of a sports car.

ULTRA-LIGHTWEIGHT DESIGN

In addition to the lightweight, high-rigidity body structure, Mazda Ibuki employs lightweight materials at key strategic points. Reinforced plastic is used for the fenders, bonnet, rear floor panel and door outer panels. Brake discs and door inner panels are made of aluminum. The propeller shaft and power plant frame are of carbon fiber, while the wheels are magnesium alloy. This judicious use of lightweight materials keeps overall vehicle weight low.

In addition to carefully choosing lightweight materials, the design team has also employed recyclable materials such as fiber reinforced plant-based plastic wherever possible.

SUPER FRONT-MIDSHIP LAYOUT

Essential to the success of the Mazda Ibuki concept is the super front-midship layout that places all critical powertrain and accessory components within the wheelbase.

The power unit, including the engine, radiator and key parts of the cooling system, is located towards the rear of the engine compartment, well behind the front axle. Compared to the current MX-5 Miata, the engine is located about 15.8 inches more rearward and 1.6 inches lower. To achieve this position, Mazda's design team moved the air conditioner unit behind the seats, an innovative idea that creates space within the dash section for part of the engine.

At the back of the car, the rear-mounted air conditioner unit, fuel tank and main exhaust muffler are located ahead of the rear axle. The super front-midship layout allows substantial weight reduction in the front and rear overhangs, enabling a 15-percent decrease in yaw inertia moment compared with Mazda's current MX-5 Miata. This decrease in the yaw inertia moment can be felt in the natural and linear handling, and superior control at the limit of tire grip. The ultra low yaw inertia moment in itself promotes the kind of driving fun expected of a lightweight sports car.

This layout also assures an adequate crushable zone, making a significant contribution to safety including the protection of pedestrians in accidents.

INTERIOR INTEGRATED WITH EXTERIOR

The high-mount backbone frame presents an axis that integrates interior and exterior design. The interior expresses

the strength inherent in the backbone structure that extends forward beyond the dashboard towards the bonnet and rearward to the cowl aft of the seats. This smooth continuity of interior and exterior is further emphasized in the smooth joining of the rear cowl and interior, and the way the passenger seat integrates with the body and creates a sense of unity between interior and exterior.

INDEPENDENT LEFT/RIGHT REAR-MOUNTED AIR CONDITIONING SYSTEM

Locating the air conditioning unit behind the seats confers two major advantages. First, it allows the engine to be mounted much further to the rear. Second, it helps enable improved independent left/right zoning so that occupants can obtain comfortably warm or cool air according to their individual needs, even when driving with the top down.

Spot-cooling zones provide cool air for the neck, the back and pelvis, and thighs, three areas of the body particularly sensitive to temperature change. Louvers are installed in the rear cowl section (for the neck), within the seatbacks (back and pelvis) and upper part of the center console (thighs).

For cold weather driving, a heating zone traps warm air between the occupants' waist and lower extremities. Warm air is directed to the thighs from a louver in the top of the center console. In this way, occupants enjoy a comfortable cabin environment during convertible driving, regardless of the season or weather.

BALANCED, RESPONSIVE ENGINE

Mazda Ibuki is powered by a new, lightweight and compact 16-valve MZR 1.6-liter inline four-cylinder engine equipped with sequential valve timing and lift for both intake and exhaust valves. The engine features an integrated electric hybrid motor that improves acceleration and partly serves to control engine vibration, allowing use of a lighter flywheel for heightened response.

At low engine speeds, the electric hybrid motor provides torque assistance to boost acceleration from a standing start. Additionally, when the car is stationary, the hybrid motor automatically stops the engine from idling to save fuel and reduce emissions. The motor then restarts the engine automatically when the driver is ready to accelerate. Also, during deceleration the hybrid motor functions as a generator, using regenerative braking energy to recharge the battery.

Mazda Ibuki features a six-speed manual transmission. The transmission weighs less than the current MX-5 Miata gearbox and has reinforced synchronizers to give a decisive yet smooth shift feel—a hallmark of the original MX-5 Miata—with extremely short, precise throws.

NEW PROPOSALS FOR SAFETY AND EASE-OF-USE

In an effort to advance safety in convertible vehicles, the Ibuki design team has installed a four-point active roll bar into the front pillars and rear cowl section that instantly lifts up under impact sensor control to reduce occupants' injuries in the event of a rollover.

Powerful LED headlamps give improved visibility, and a keyless entry by ID card is provided. Other innovations include a unique side-parting boot offering a wider opening and easier access. In addition, a new audio system that combines the seat air conditioner ducts and speaker in one, delivers much clearer sounds. This feature enhances the convertible driving.

Mazda IBUKI Main Specifications

Dimensions

Overall length: 143.3 in. (3640mm)

Overall width: 67.7 in. (1720mm)

Overall height: 48.4 in. (1230mm)

Wheelbase: 91.7 in. (2330mm)

Track front/rear: 58.7 in./58.9 in. (1490mm/1495mm)

Occupancy: 2

Engine

Type: MZR 1.6L in-line 4-cylinder DOHC, direct injection with dual S-VTL and hybrid motor with idle-stop function

Horsepower: 180 @ 7500rpm (estimated)

Torque: 180 lb-ft @ 6000rpm (estimated)

Transmission

Type: 6-speed manual

Suspension

Suspension system front/rear: Double wishbone/multi-link

Brakes

Main brake system front/rear: Ventilated disc

Steering

Type: Electric power assist rack and pinion

Wheels and tires

Tires front/rear: 215/40R18 (run-flat tires)

Wheels: 18 X 7.5J

Mazda North American Operations (MNAO) is responsible for the sales and marketing, customer service and parts support of Mazda vehicles in the United States. Headquartered in Irvine, Calif., MNAO has more than 700

dealerships nationwide.

EDITOR'S NOTE: For more detailed information on the full line of 2004 Mazda products, please use the enclosed CD-ROM or visit the online Mazda media center at www.mazdausamedia.com [9].

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