



*Stunning from the start.*

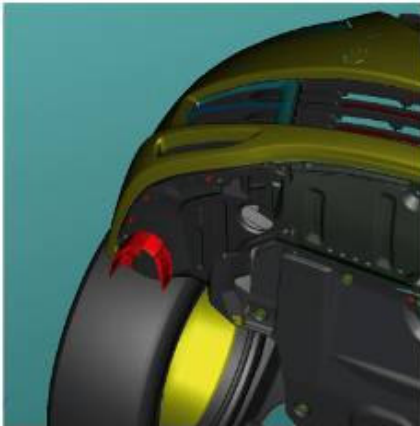
**Mazda6 From A to Z**

# Mazda6 from A to Z

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# Aerodynamics

From the early stages of design development, the designers, aerodynamics engineers and the Program Manager – Ryuichi Umeshita - put their heads together to achieve class-leading aerodynamics. Following plenty of simulation, wind tunnel testing (almost 40 sessions and more than 300 hours) and numerous hurdles, the engineers persevered and conducted a thorough analysis for improvement.



One of the highlights is the horseshoe-shaped tyre deflector, which solved a very difficult issue of balancing out aerodynamics and brake cooling. With the early stage tyre deflectors (board type), it was difficult to bring in air to reach the brakes. Thereafter, Ohira, in charge of aerodynamics, went to the wind tunnel to

re-evaluate wind flow and developed the horse shoe shape tyre deflectors. Further particulars like the deflectors hitting the curb while parking or snow sticking to the deflectors were tackled... until the current shape and position were achieved.

Cd	Current Mazda6	New Mazda6
Sedan/Hatchback	0.30	0.27
Wagon	0.32	0.28



Horseshoe-shaped front tyre deflectors: this is not only effective in reducing air resistance and improving stability at high speeds, but in improving brake cooling as well.

Rear tyre deflectors: often used on sports cars, rear: deflectors smooth the airflow behind the vehicle.

Radiator cover: this is newly added to the underbody and the shape is optimised. By smoothing out the airflow at the entrance to the underbody, air resistance is reduced.

Rear cover: this cover mainly improves airflow to the under body at the rear, reducing air resistance as well as improving stability at high speeds.

### About Mazda's wind tunnel...

Mazda's Aerodynamics Testing Laboratory was established in 1983 and is capable of conducting tests on various model sizes, from one fifth scale models to 1/1 size. The blower can produce a maximum wind speed of 230 km/h. Aerodynamic specialists also simulate snowfalls and rain conditions to test the rear and side windows.



By reducing the air resistance level, when driving on the autobahn, the all-new Mazda6 accelerates smoothly up from 200 km/h, the point where the air resistance could be felt in the previous model.

## Bose®

### The Bose® Sound System for the Mazda6



Enhancing the driving experience in the Mazda6 Luxury and Luxury Sport is the eight-speaker 240W Bose® sound system which is customized specifically for the Mazda6 cabin to help reproduce music with more of the power and emotion of a live performance. Speakers are as follows: a mid-high-range speaker in the centre of the dash, two tweeters by the door mirrors, and four low-mid-range speakers on the lower part of the doors, a Richbass® woofer in a 10-litre custom-engineered bass enclosure in the spare tyre wheel well on the Hatch model. AudioPilot® noise-compensation (digital amplifier and an interior noise level monitoring microphone on the dash in front of the driver) technology helps preserve the listening experience when confronted with the effects of unwanted outside sound and vehicle speed.

The system has been built as part of the car to preserve passenger and cargo space.

# C F-Net

## CF-Net stands for “Cross-Functional Network”

The CF-Net system helps the driver to operate safely and conveniently the main information and entertainment systems of the car (Audio, Cruise Control) without removing his hands from the steering wheel, a true improvement in terms of active safety.

During the testing sessions, an engineer was covered with monitoring cameras to check what the benefits time-wise are of this more instinctive system. The results showed operation times shorter by 20 to 30 per cent compared to well-known premium brand selection-mode systems.



The name “Cross-Functional Network” doesn’t just mean the gathering of functions in one place, but also the cooperation of different departments within the Mazda R&D community to work as one team to develop this new feature.

# Design

After evaluating hundreds of sketches, four quarter-scale proposals were evaluated. After subsequent customer clinics in Europe, two models were completed at 1/1-scale (see below: A and B). In March 2005, the team chose model A for its stronger character.

Model A



Model B

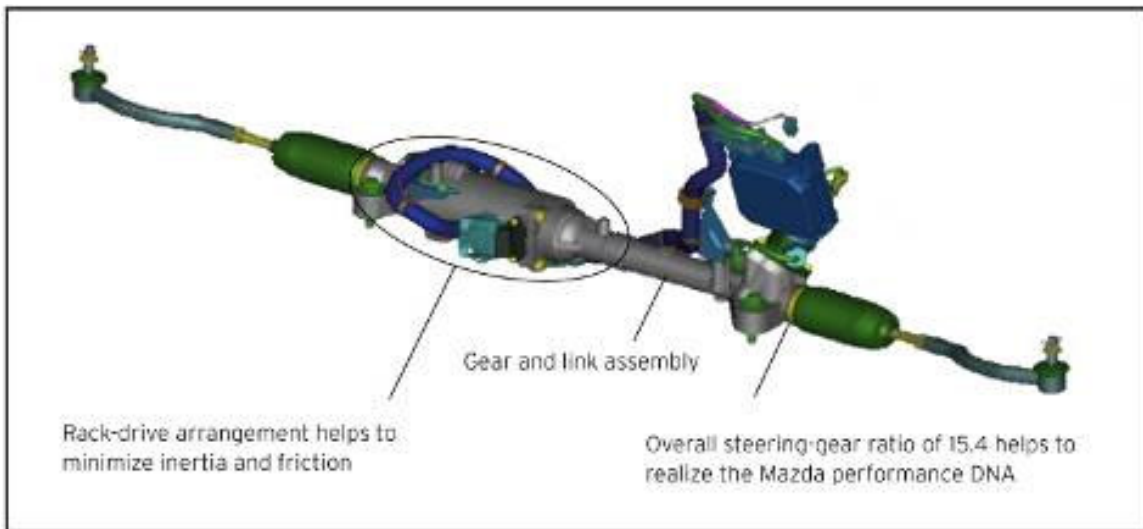


A main goal for this project was to finally bring Japanese aesthetics into the car and create a Japanese car design identity, just as Europeans carmakers have built cars that express their own culture - the best examples during the last decades being Italian and German cars (see letter J, Japan).

The Japanese character of Mazda6's design is based on three pillars : Rin, Seichi and Yugen (refer to letters R, S and Y).

# EPAS (Electric Power Assist Steering)

A newly-developed electric power assist steering system with speed sensitive control is utilised on the new Mazda6. This improves steering rigidity feel and straight ahead stability. It also improves fuel consumption by up to 2 percent.



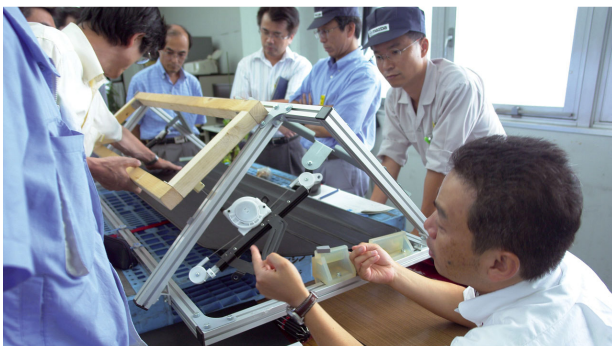
Whereas most of these kinds of systems are fixed on the column, this one is directly fixed on the rack like on our RX-8 sports car. The system is in fact an updated version of the one used on the RX-8 and utilizes a small brushless motor to hold the inertia level, which is a first for Mazda.

A total of approximately 150 different specifications were tested during the development.

## Functionality

The generous boot volume of the wagon found a perfect complement with the Karakuri tonneau cover. With this new feature, it is possible to reduce the effort of putting on/ off the cargo cover. Thanks to a clever mechanical system, the luggage cover lifts up automatically when you open the tailgate, making everyday life easier.

The development of the Karakuri tonneau cover included a total of 10 different prototypes with repeated testing. The target was to provide a lightweight easy-to-use Karakuri tonneau cover.



\*Overseas model shown

Umeshita-san studying one of the several Karakuri tonneau cover prototypes

# G generation

The tradition of C/D segment (family- sized) vehicles at Mazda began in 1967 with the 1500. This elegant, 4.37m car was designed by Bertone, ensuring a dynamic styling. Key attributes have always been found in Mazda's C/D vehicles ensuring that they were emotional & sporty with an insightful package.



In 1987, the Mazda 626/Capella introduced an unbelievable Four Wheel Steering System – the first of its kind in the world - to enhance the pleasure of driving the car's supercharged diesel engine, which raised diesel engines to a new level of performance. It was designed as a family car with no compromises on volume and luggage capacity.

Obviously the highlight of this tradition came in 2001 with the introduction at the Tokyo Motor Show of the first-generation Atenza\*/Mazda6.  
\*name for the Japanese market.





## HMI (Human Machine Interface)

For more than 20 years, in parallel with computer developments, the automotive industry has been studying how to make vehicle-driver/passenger communication easier. As we spend several hours a day in our vehicle, any improvement in the HMI adds to the pleasure of ownership.

The human-machine interface interacts with other elements such as the “cross-functional network” (see letter C) when giving a command on the steering wheel to access very instinctively the audio or, cruise control.



## Illumination

Illumination in a Mazda cockpit is part of the Zoom-Zoom experience. Seen first in 2003 in the Mazda3 the “Action Illumination” can be enjoyed every time you adjust the volume of the audio system.



This concept was developed further in the Sassou concept car (Frankfurt 2005) where every input reacted with a heartbeat of light flowing to the speakers or the air conditioning unit, showing the path of the input to the driver.

This is evolved further in the new Mazda6 with edged audio buttons with lights that come on, go off, and flash in a fade-on/fade-off manner for intuitive feedback to the user’s button-pushes. Illumination is in blue.

Mazda6 features a blue night time ambiance light for a pleasant mood (Luxury and Luxury Sports).



# J apan

## **Time to be Japanese!**

Rather than translating directly Japanese forms into Japanese car styling, Mazda wanted to interpret Japanese aesthetics from its unique perspective to create its own original flavour. “Since it could be said that we are now competing on a level to European makers in terms of vehicle performance, we must find a way to express Japanese cultural and social identity in modern car styling, and so emphasize Mazda’s individuality. That’s what we call Exotic Avant-Garde”, says Youichi Sato, Chief Designer of the new Mazda6.



He continues: “I feel that the current age is the time for us to further incorporate Japanese culture and the Japanese aesthetic into car design. We have to establish a style of car design unique to Mazda, with the embodiment of the unique Japanese character. Spreading this message was our objective”.

## **Addition/Subtraction or the history of car design.**

For Sato, we are entering a new era of design : in the 20th-century, car styling was like layering elements over one another. “I call it the design of addition . This can be said to be a characteristic of Japanese car design. However, in the 21st-century we have greater technical capability and flexibility, so we can separate individual design elements, remove the superfluous, and produce a simplified but highly polished style. I call it the design of subtraction . When you see a refined object, you don’t see any unnecessary decoration. I feel we should pursue this kind of thinking with car styling as well. Contemporary Japanese product design is quite simple, and this simple beauty sends a powerful message. However, it seems to me that current car styling is about the only area that does not fully reflect this Japanese identity. Therefore, I’m convinced that the ‘design of subtraction’ will provide an aesthetic Japanese value which will appeal to the world”.



Mazda 818 Coupé, 1971 Design of addition



Mazda6, 2007 Design of subtraction

## K izuna

The Japanese expression Kizuna or “emotional connection” is a key to describe our new vehicle development philosophy. Kizuna implies strong emotional ties such as those between people. Mazda’s efforts to evolve Zoom-Zoom go further than just innovative design and high specifications. They also seek to create a strong affinity that drivers and passengers have for the vehicle based on feelings of reliability, comfort and empathy. For example, the visual welcome you get from the car each time you get in (see letter I, Illumination) illustrates the empathy the driver can feel from his car.



## L ED

LED (Light-Emitting Diode) is introduced for the first time as standard on all Mazda6 vehicles (LED has been already available in on the high-grade Mazda3 SP23, Mazda3 MPS and RX-8).

Besides the power-saving delivered by this technology, the LED stop lamps have a true safety function. Their brightness translates into better visibility and prompter braking notification for the cars behind.



# Miyoshi

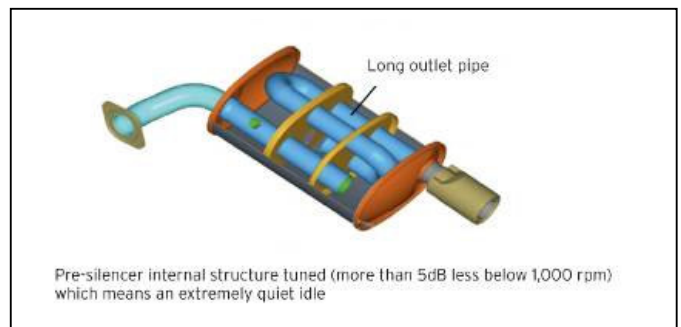
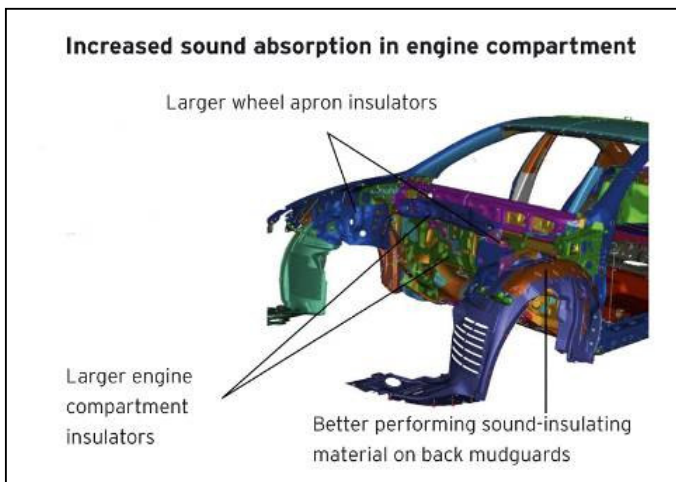
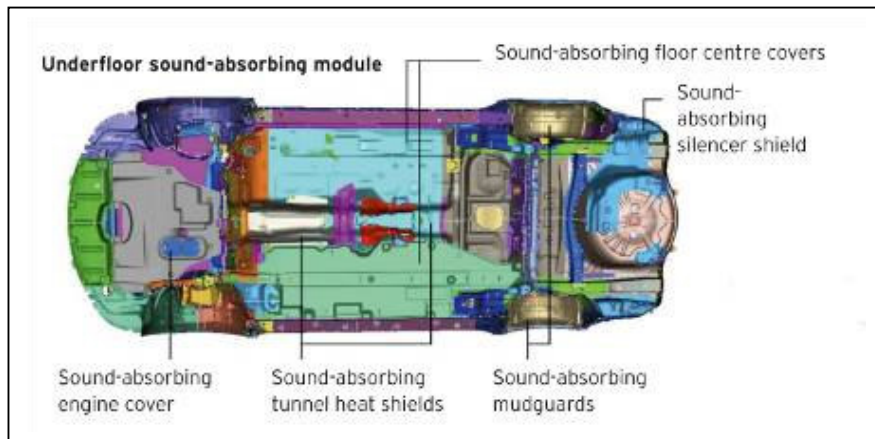
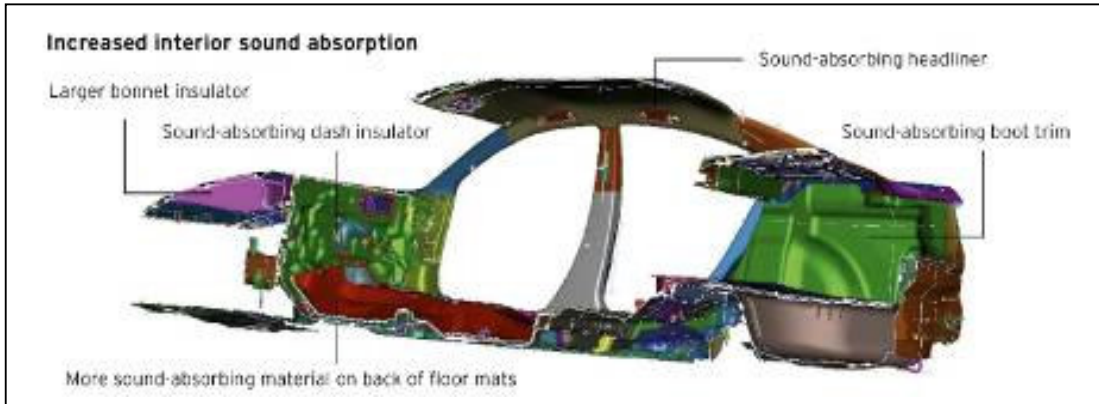
Opened in 1965, Mazda's Miyoshi proving grounds have played an important role in new-vehicle development. With 167 hectares, it has facilities to test handling, stability, collision protection and to conduct endurance tests.



Driving courses have been developed to imitate some typical roads including Autobahns, Belgian paved roads, difficult curvy roads like you could find in Corsica and even the coarse chip found on Australian roads... the Mazda6 enjoyed them all.

# NVH

To offer an exclusive driving experience, extensive work has been done to deliver a refined interior environment.



Additional measures have been taken to lower road noise in the area of the body with acoustics & insulation, in the suspension and to lower wind noise.

## O berursel

Just 15 km from Frankfurt (Germany), Oberursel is home to Mazda's European R&D staff. This is where extensive tuning on European roads is conducted for new models. With one of the market's for the new Mazda6's being Europe, the Oberursel team was involved very early in the development process, far more than just "fine-tuning"... Many sessions took place to test and validate, among others, the engine and transmission set-ups especially on the diesel aggregates, the chassis settings (steering, suspension, braking), the tyre choice and the lighting system.



High-speed testing (stability, NVH...) on German Autobahns was also conducted at night.



Testing in Finland? No, this was in February 2007 in Germany.



A cultural melting pot at the European Mazda R&D Centre seen here wrapping the car before public road tests.

## P rototypes

There were a total of 127 prototype vehicles used for the development of the second-generation Mazda6. Depending on the body type and engine variation, there were 3 stages of prototype evaluation. Vehicle testing was conducted in Hiroshima at the Miyoshi proving grounds, at Hokkaido for cold testing and at Mazda's Motor European R&D Centre.



# Q uality

Mazda has been developing its own engineering standard for quality and reliability that meets EU market demands. However, there is no end to pursuing an outstanding level of quality and reliability. While inheriting some of the attributes of the current model, further improvement in quality is visible in various areas. The body panel gaps (one of the first visible elements of high craftsmanship) have been optimized, for example, for the lay-out between the front fenders and the bonnet.

## Product Quality rewarded



On AutoBild's 100,000km endurance test in 2005, Mazda6 became the first car to ever have zero defects and no breakdowns, the best any vehicle has ever tested (and it has remained number one ever since)



The J.D. Power and Associates 2006 Germany Customer Satisfaction Study polled over 22,000 drivers in Europe's largest market, and ranked the Mazda6 "Highest in Customer Satisfaction among Upper Medium Cars".

## Quality at Mazda is a tradition



Kaizen Engineering is part of the Japanese approach to improve quality by continuous improvements. As early as 1962 Mazda practiced very strict quality control introducing employee Quality Circles.

# R in



"Rin", together with "Seichi" and "Yugen" are the three words that Sato, the designer of the Mazda6, chose to represent the characteristic Japanese images to be used as the basis to define a new car-styling perspective. Elements to identify the "Designed in Japan" aspect of the Mazda6.

RIN means "dignity." This is about strong will with a sense of tension. It is like the Japanese sword; the well-shaped and extremely sharp blade. Its prominent appearance makes an immediate impression that is not easily approachable. It is like the beautiful spiritual world mixed with a hard-edged impact that arises from Zen and the martial arts. An example is "Shibaraku" Kabuki (traditional Japanese theatre) costumes.

# Seichi

Related to Mazda6 design, “Seichi” means exquisite or refined/precise. This is about getting down to the details, even for tiny objects, and creating a refined product. This precision craftsmanship is usually in harmony with nature. This can be called a “compact or condensed beauty,” which emerged through Japan’s history and climate.



Japanese tend to refine things through miniaturization and exacting details without compromising the level of craftsmanship. This is still ubiquitous today. Some examples are bonsai trees and “Gundam” (toy figures from a Japanese cartoon). It can also be seen in state-of-the-art objects, such as modern mobile phones, and Japanese culture, such as Haiku poems.

Of course, the letter also refers to Youichi Sato, Chief Designer of the new Mazda6.



“My previous work has mainly involved designing car exteriors. My first project was the last FR (Front engine-Rear wheel drive) series Mazda 626. Then I worked on the first generation FF (Front engine-Front wheel drive) Mazda 323 and 626. After that, I entered the world of sports cars and Motor Show concept design.



After working as a designer on the Mazda MX-5 advanced design and as the Chief Designer for the third-generation RX-7, in 1999 I launched the RX-Evolv, the concept model for the RX-8. At that time, I was involved in designing several concept cars, which led to the new-generation products. More recently, I went back to mass production product design, to create the all-new Mazda6 you are experiencing for the first time. ”



# Toluene

Toluenes such as xylene or formaldehyde, are volatile organic compounds (VOCs) that are highly evaporative substances known to be major causes of Sick House Syndrome. They are emitted by organic materials (for example, plastics, coatings, and adhesives) that are used in car cabins. Under the control of the Japan Automobile Manufacturers Association (JAMA), Mazda participates in the first industry-wide VOC-reduction programme.

Instead of looking at after-treatment solutions, Mazda is reducing the VOCs used in components at the start. Working closely with suppliers, low-VOC material developments are encouraged. In the new Mazda6 a new sealer is used, helping to make the interior toluene concentration about 60% lower than that of the current model. Other VOC minimizing measures include a low-VOC coating on the instrument panel, low-solvent polypropylene and adhesive tape.



# Umeshita

**Mazda6 Programme Manager Ryuichi Umeshita has spent almost 20 years at Mazda**

“I joined Mazda in 1988 and my first assignment as a vehicle body engineer was to draw out the structure of the bracket used to hold down the battery for the first-generation MX-5.

Now that I think about it, this tiny part may be my starting point in pursuing Zoom-Zoom as a Mazda engineer.

1999 was one of the turning points in my career. After my 10 years devotion to engineering, I started working on overall Mazda6 engineering with the Programme Manager.

Then in 2004 I took the role of Programme Manager for the all-new Mazda6”.



# Ventilation



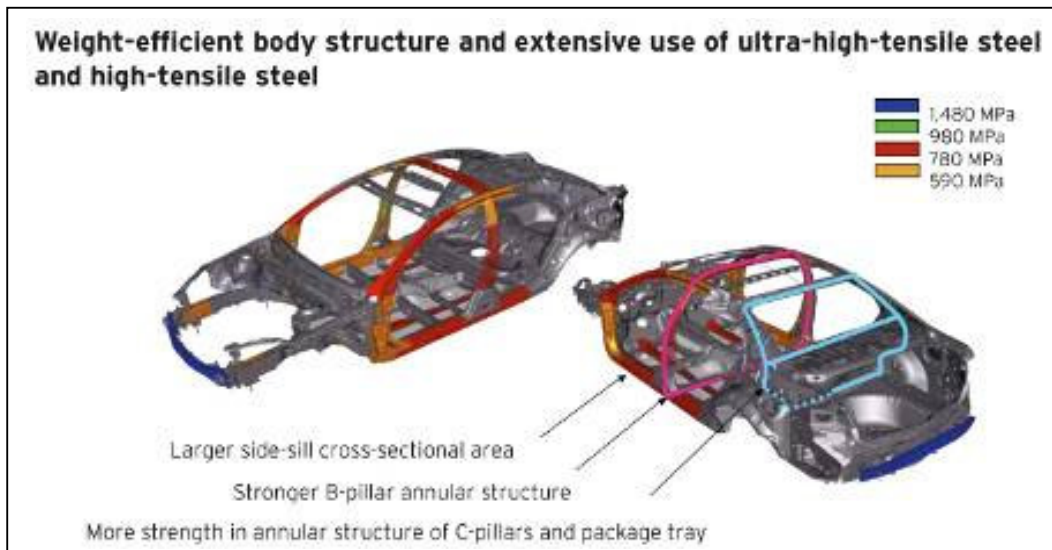
There is a new heating, ventilation and air conditioning system with separate controls for the front seats in the 2.5L models allowing the front passenger to set a separate temperature to the driver.

# Weight

Mazda's Gram Strategy, which strictly controlled the weight of the new MX-5 Roadster and Mazda2 light car, was employed to save weight on the new Mazda6. If Mazda had not paid close attention to weight in all areas of the Mazda6, its kerb weight would have ballooned out. Instead, Mazda kept the kerb weight increase to 50-85kg depending on model – a great result given the major increases in size, safety and equipment on the new Mazda6.

The two main R&D targets developing the body shell were to increase the rigidity of body parts; and to adopt a weight-efficient body structure including high proportions of high-tensile steel and ultra-high-tensile steel. The proportion (by weight) of the body made from ultra-high and high-tensile steels was increased from 42% for the current Mazda6 to 49% for the new model.

Steel type	New Mazda6 (in mass ratio)
400-440MPa	23%
590MPa	15%
780MPa	9%
980MPa	0.2%
1480MPa	2%



## Weight-saving measures on the new Mazda6

**Body Shell**

Thanks to an optimized body structure, weight was reduced by 4.3 kg compared to the previous Mazda6

**-2.3kg****Bumper Beam**

- Use of ultra-high-tensile material

**-6.8kg****Interior trim**

- Sound absorption material change
- Utilization of lightweight dash insulator

Overseas model shown

**-5.0kg****Front and Rear Seats**

- Optimized structure and utilization of high tensile material

**-4.0kg****Rear Suspension**

- Trailing link structure change
- Steel press arm + cast metal knuckle instead of weldings
- Optimized cross member structure

**-6.7kg****Body attachment**

- Engine undercover material change
- Body structure optimization

**-1.5kg****Audio**

- Change of the speaker magnet material from ferrite type to Neodymium

## X-factor

The all-new Mazda6 has it in spades. One glance at it and a single word comes to mind. Stunning. And it is obvious from start to finish. The distinctive, sweeping body lines give this car a stunning on-road presence and the exceptional craftsmanship is evident in every detail.

But it doesn't stop there. The all-new Mazda6 is more refined, more mature, more premium, with more exquisite quality and is more exhilarating to drive.

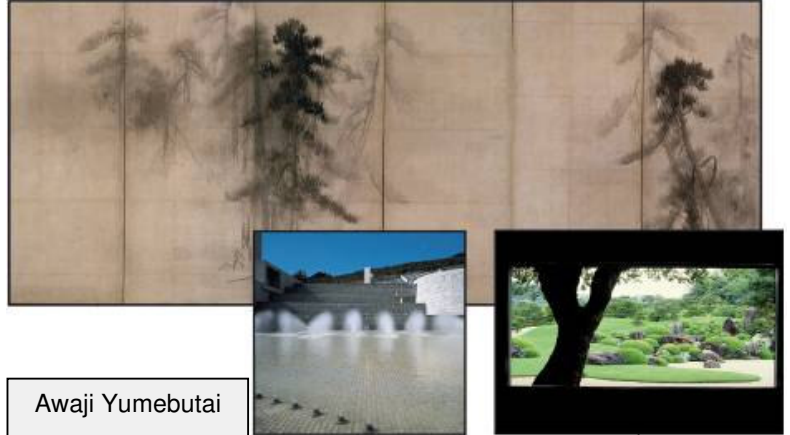


# Y ugen

“Yugen” is about harmony with nature and the search for a world which values the subtle and the profound. Japanese live with and adapt to the changing seasons. “We don’t try to control nature but try to fit ourselves around it. This is the basis of the Japanese character. Additionally, we tend to prefer infinite suggestiveness and subtlety, over explicitness and brashness. We care about the hidden underlying depth of things”, explains Sato, Chief Designer of the new Mazda6. In terms of design of the Mazda6, this can be reflected in empty spaces, and purposefully designed featureless areas. It can be said to be characteristic of the Japanese

composition of space. Some examples are: the Adachi Museum courtyard in Shimane Prefecture, “Pine Trees” which is a folding screen with six panels painted by Tohaku Hasegawa (16th century, today at the Tokyo National Museum), and Awaji Yumebutai (a Memorial to the 1995 Kobe earthquake on the Awaji Island), to name but a few.

Shorin-zu screen, “Pine Trees”  
at the Tokyo National Museum

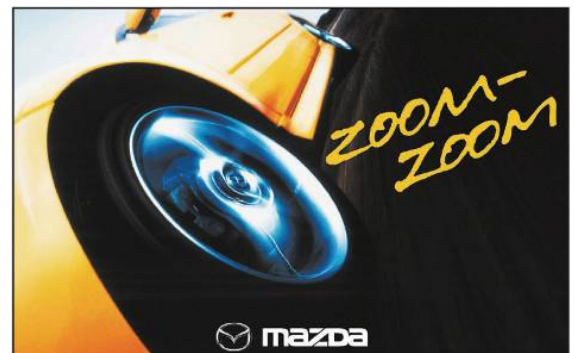


Awaji Yumebutai

Garden in Adachi Museum of Art

# Z oom-Zoom Evolution

Zoom-Zoom is the sound children make when imitating a car engine while playing. At Mazda, this reflects our spirit of passion when developing our cars. The second-generation Mazda6’s engineering concept embodies the evolution of Zoom-Zoom. This word also resembles the commitment of all engineers working on this car to “bring to the world a further evolved Zoom-Zoom from the current Mazda6.” This includes high quality design, a superior driving experience in harmony with comfort and environmental constraints, in order to further attract customers to our products and increase loyalty to the brand.



In concrete terms, it adds an increased focus on environmental and safety aspects, on top of Mazda’s traditional Zoom-Zoom values (distinctive design, exceptional functionality and responsive handling and performance).