The Second-Generation Mazda6

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1. Introduction

Zoom-Zoom Evolution

- **All-new Mazda6: a new-generation model with evolved Zoom-Zoom DNA**
- **Mazda6 is one of Mazda's best-selling cars globally**
- **Estate with 2.0-litre common-rail diesel most popular version in Europe**

In 2002, Mazda Motor Corporation introduced its first new-generation model, the Mazda6, which changed the face of the Mazda brand and initiated an era of sales growth that has continued to this day. In Europe, Mazda6 has been a sales evergreen with more than 450,000 Mazda6's sold since 2002, helping Mazda Motor Europe to nearly double its sales during the last five years.

Today, Mazda6 sales in Europe are dominated by the estate version with an MZR 2.0-litre turbo-diesel engine under the bonnet. Of the three distinct body styles (estate, hatchback and sedan) roughly 40 percent of all Mazda6 sales were estates in 2006. The sporty-looking Mazda6 hatchback was almost as popular, accounting for 34 percent, and about 26 percent of all customers chose the sedan. Last year, the estate was the most popular model in Italy and Germany, with 86 and 69 percent of all Mazda6 registrations, respectively. The hatchback was especially popular among the French, with 82 percent, while the sedan has proved a hit in Ireland with 83 percent, in Greece with 79 percent and in Russia with 75 percent, of all Mazda6 buyers ordering a four-door. In 2006, 39 percent of all Mazda6 customers preferred the smooth, cultivated power of the frugal 2.0-litre turbo diesel and 30 percent the 2.0-litre petrol.

Mazda6's popularity is not limited to customers alone. Since launch, it has won 130 automotive awards including 'RJC Car of the Year 2002' in Japan, 'Car of the Year 2003' in New Zealand, 'Car of the Year 2004' in China, and a total of seven important automotive awards in the USA in 2003 and 2004. In Europe, it has won 59 awards in 28 European countries to date and placed a very close second in the 'European Car of the Year' award in 2003.

Three Key Values Delivered by the all-new Mazda6
Ryuichi Umeshita, Mazda6 Programme Manager

"Our concept for development of the second-generation Mazda6 was 'Zoom-Zoom evolution.' This expression represents the commitment by every development team member to show the world a further evolved Zoom-Zoom from the first-generation Mazda6. To turn the concept into reality, we worked toward three key values. The first was 'emotional and sporty' for a visual and a driving experience that would create an unprecedently strong feeling of oneness with the car. The second was an 'exclusive experience' of quality that would cause drivers to feel a unique, strong emotional bond with the car. And the third was an 'insightful package' that would make using the car on a day-to-day basis a genuine pleasure. While deepening the *Kizuna* or "emotional connection" with the development team, I came to appreciate this connection with the Mazda6 itself. I firmly believe that together with the enhanced new technology and realisation of high levels of performance, it is just as important to realise a strong *Kizuna* between the car and the driver coming from the sense of reliance, comfort and affinity with the car."

The all-new, second-generation Mazda6 enters the European C/D-segment (family-sized) with three body styles (sedan, hatchback and estate) like its popular predecessor. During the last five years, segment volume has dropped from 1.8 million in 2002 to 1.6 million units last year – due mostly to customer migration to smaller C-segment vehicles or new MAV-SUV alternatives. The Mazda6, however, was one of the segment's winners during the same period, conquering a 5.7 percent share in its first year after launch (2003) which is almost double the share of the highly successful Mazda 626 during its best years on the market.

The new Mazda6 has been comprehensively developed from the ground up: it has attributes that create what developers call *Kizuna*, or a strong emotional connection between the car and its driver, like a close friendship. It has vastly improved quality feel, better handling and performance for an exclusive driving and ownership experience, and it is larger for an insightful package so important to C/D-segment customers.

Sustainable Zoom-Zoom

The 'Sustainable Zoom-Zoom' development strategy at Mazda Motor Corporation was announced in March 2007 and is targeting an enhancement of Mazda's environment compatibility and safety. Consequently, during development of the second-generation Mazda6, one of the main focuses was a further improvement in environmental compatibility. Mazda began strictly controlling the weight of its newest vehicles (compared to their predecessors) with the third-generation MX-5 (+1 percent) and the all-new Mazda2 (-10 percent). The same weight-watching techniques were applied in developing the new Mazda6 with the result that, despite being larger and better equipped, the newcomer is up to 2.4 percent lighter (- 35 kg) than the outgoing model. This reduced weight is combined with a dramatic improvement in aerodynamic performance and an insightful application of engine technologies to ensure that, regardless of model or powertrain, every new Mazda6 uses less fuel and emits less CO_2 than the outgoing model.

Seita Kanai, Director, Senior Managing Executive Officer in Charge of Research and Development

"The new version not only inherits the first-generation model's highly acclaimed aspects, but also shows dramatic advances in its distinctive design, exceptional functionality, and responsive handling and performance

– the three essential elements of Mazda DNA. I believe that Mazda's determination to build cars that 'look inviting to drive, are fun to drive, and make you want to drive them again,' while also advancing environmental and safety performance, is perfectly embodied in the new Mazda6."

2. Design

Japanese Aesthetics

- **New exterior design with strong emotional appeal inspired by Japanese aesthetics**
- **Three distinct body styles (sedan, hatchback and estate) for every conceivable taste**
- **Fresh interior with greatly improved quality look and feel**

The new Mazda6 is designed to express the Zoom-Zoom spirit in a more radical, progressive form. Bold and sporty-looking, and executed with exquisite build quality based on Japanese aesthetics, it elicits levels of emotional appeal usually associated with premium cars of this class. This combination gives it a sophisticated and cool appearance that is uniquely Mazda.

Photographic Sources
Garden in Adachi Museum of Art (Yugen)
Japanese Sword, Iwakuni Museum Foundation (Rin)

Japanese Aesthetics and the new Mazda6

In creating the new Mazda6, Chief Designer Youichi Sato incorporated design attributes from Japanese aesthetics as a way to give the car a look that is immediately recognisable as a Mazda, but that is clearly distinguishable from other Japanese and European cars. Three key design motifs were used to realise this. The first motif was 'YUGEN', or 'ethereality' that is reminiscent of the gracefulness of nature (Japanese landscape). The second was 'RIN,', or 'dignity' of form that communicates calm determination and strength (Japanese sword). The third was 'SEICHI,' or 'exquisiteness' which is expressed through precise craftsmanship and quality (mobile phone). The dynamism created by the contrast between the ethereality of 'YUGEN' and the dignity of 'RIN,' is formed with the spirit of 'SEICHI. This bold incorporation of Japanese aesthetics in developing the design of the new Mazda6 has delivered an exotic, almost avant-garde styling that cannot help but elicit an emotional appeal in all who see it.

Exterior Design Theme – Bold and Exquisite

While inheriting the same athletic image of the first-generation model, the all-new Mazda6 is decidedly sportier and more aggressive with round, protruding wheel arches, short overhangs and a new front end. A smooth, rounded bonnet interrupted by sharp edges at the sides formed by prominent and sporty-looking fenders creates a sense of tension and dynamism. A new front bumper design has new headlamps with a modern, next-generation design, a large lower air intake and vertical-type fog lights. To this is added a new interpretation of the five-point grille to give the latest Mazda a strong face. Seen from the side, the new Mazda6 is characterised by side-body lines that flow towards the rear of the car in a series of expressive changes that create patterns of light and shadow. The new rear end is richly sculptured with large, wrap-around rear lamps and a license plate integrated into the bumper for a more premium look than before.

The new **Mazda6 sedan** is longer (4,735 mm, + 65 mm), wider (1,795 mm, + 15 mm), taller (1,440 mm, + 5 mm) and has a longer wheelbase (2,725 mm, + 50 mm) than the outgoing sedan. Despite these increases, the new Mazda6 sedan is sporty-looking for a four-door – a characteristic that clearly defies the usual sedan 'three-box' design.

Sporting the same dimensions as the sedan, the new **Mazda6 hatchback** is characterised by a sleeker, coupe-like profile – easily recognisable by its third side window – compared to the outgoing hatchback. Its roofline is sleeker than the sedan's and falls away less steeply at the rear. The **Mazda6 estate** is the longest of the new models (4,765 mm, + 75 mm), and it is wider (1,795 mm, + 15 mm) and only slightly higher (1,490 mm with roof rails, + 10 mm) than the previous model. It has a more prominent kick-up beltline and a sleek glass area with body side surfaces that flow into the tailgate.

Sports Appearance Package (SAP)

The new Mazda6 can be chosen with a sports appearance package for even more emotional appeal and sportiness. It has a unique design for the front end with a special flying-wing front grille, side sills and rear bumper, all of which are more integrated than before for a highly sculptured look. The rear spoiler is sharp and sporty-looking, and 18-inch alloy wheels and special metallic-look rear combination lamps add a touch of sophistication. When combined with the new Mazda6's improved build quality, this second-generation sports appearance package is truly sporty and aggressive with a more integrated look than ever before.

New 16, 17 and 18-inch wheels are introduced with striking three-dimensional spoke designs. The 18-inch wheel has robust-looking spokes and large cooling openings for a sense of high performance. The new Mazda6 will now offer customers 12 exterior colours to choose from, including one all-new colour called Lilac Silver Metallic.

Interior Design

On the inside, designers continued the 'bold and exquisite' theme of the exterior. Here the new Mazda6 is sporty and sophisticated with a completely new look that is carried out with a dramatic improvement in quality, vital to providing an 'exclusive experience.' A sense of sportiness was achieved by realising an intimate cockpit design that lets the driver experience Mazda6's enhanced Zoom-Zoom driving fun to the fullest, while contributing to a feeling of being at one with the car. In parallel, they created an overall interior with a wrap-around feel for a feeling of safety and comfort. Mazda6 also uses a floating-look instrument panel that lends the front of the cabin visual lightness and contributes to an overall sense of openness and space. The door trim has sharp lines and precisely shaped grooves embedded in their curved surfaces for a strong sense of quality.

3. Quality, Comfort & Equipment

Premium Look & Feel

- **Spacious cabin with more leg room, head room and shoulder room**
- **Optimised cockpit design for enhanced driving enjoyment**
- **New engine start/stop button**
- **Large tailgate and boot opening width, with new automatic Karakuri tonneau cover for the estate**

From the moment it appeared in European showrooms, the original Mazda6 set the standard amongst C/D-segment cars in providing sporty design appeal combined with a large and comfortable interior. The second-generation Mazda6 takes this concept to the next level by adding high levels of quality.

New Levels of Craftsmanship and Quality

The all-new Mazda6's exterior and interior are made with the highest levels of quality ever seen on a Mazda car and provide the type of 'exclusive experience' normally associated with premium brands in this segment. On the outside, body panel gaps were optimised and designers employed refined body surfacing, which make the new Mazda6 look like it was forged from a single block of metal. An exquisite eye for quality detailing here includes:

- a minimal gap between the bonnet and fenders, which is designed to hide the bonnet panel when seen from the side for a clean and sculptured look,
- stainless steel sash around the window area,
- 'one-with-the-car' side sill garnish,
- windscreen washers built into the front cowl for a neat, integrated look.

On the inside, the 'exclusive experience' begins with exquisitely crafted detailing: like a gear shift lever that feels similar to a precision instrument, like easy-to-use audio controls, like the feel of the air-conditioning control dial, along with materials and surfaces that are appealing to the touch. Details of improved interior quality here include:

- high quality leathers and fabrics for seats, pillars and headliner,
- a premium-feel dimpled finish for the centre console,
- a sliding centre armrest made of quality materials with detailed stitching (depending on grade),
- attractive decorative panels and door switch trim with minimum tolerances for a neat, clean look.

And Mazda6 also delivers significant improvements in perceived quality feel and in functional beauty. Everything has been made to be more appealing and user-friendly than before. Refined shapes are employed for instruments, dials and buttons that are easy to operate and manufactured to communicate solidity, all of which contributes to the 'exclusive experience'.

Masanori Kodaira, Engineer for Vehicle Basic Design

"Combining Mazda's packaging excellence with the new Mazda6's great design was a tough challenge. A particularly attractive part of the new Mazda6 is the flowing roofline, so we worked hard to identify the packaging solutions needed to create ample space within it. With regard to the rear seats, we found that sedan users (particularly those in Europe) rated foot and knee space as their greatest concern. For us, then, the key was to realise plenty of knee space. By taking this kind of customer-need-focused approach throughout the cabin, we were able to create a sense of roominess far superior to that experienced in the previous model."

Sporty-look combined with Spatial Efficiency

When it comes to combining emotional and sporty exterior designing with comfort and roominess, the new Mazda6's package engineers were able to deliver even more of what customers have come to expect of a car in this segment. It is longer, wider and higher; with a longer wheelbase than the outgoing model for more room on the inside and a more practical boot. It accomplishes this despite having an even sportier and emotionally appealing exterior design. Its longer wheelbase and increased vehicle length translates into **20 mm more rear leg room** (from 927 mm to 947 mm). An increase in overall width means **9 mm more shoulder room** (from 1,421 mm to 1,430 mm) and one of the **widest boot and tailgate openings in this segment** that ensures ease-of-use when loading the luggage compartment and does not compromise the sporty exterior form.

Enhanced Comfort and Ease-of-Use

Mazda6's cockpit is vital to realising the designer's key target of providing an 'exclusive experience' by being comfortable and easy-to-use, and instilling a feeling of on-road confidence. Driver visibility is improved. Mazda engineers achieved a **forward-upward visibility that is one of the segment's best**, despite the car's sporty roofline, by moving the contours of the headlining rearward. This gives a feeling of openness and allows the driver to see traffic lights, for example, without having to lean forward. In addition, new door mirror shapes and newly-designed rear head restraints make it easier to see rearward, the high-mounted central brake lamp is now moved to the boot lid and a rear parking sensor system is available as well (depending on market and grade).

A new steering wheel angle is introduced (reduced from 23° to 21°) which makes the wheel a little more vertical and moves the top of the steering wheel towards the driver – like a sports car. This makes steering easier and more efficient, as the driver moves his shoulders less when turning and the arms are better positioned when gripping the top and bottom of the steering wheel. It has a three-spoke, steel-look design similar to the MX-5 roadster, along with buttons and switches, combined with an engine start/stop button (depending on grade) on the instrument panel. And of course, the steering wheel is tilt and telescopic adjustable. The gear shift lever's position is inspired by Mazda's sports car models and is now placed 32 mm higher and 22 mm closer to the driver than before, allowing for easier gear selection. Added to this is **a sliding centre arm rest** that allows drivers of all sizes to find the perfect resting position. The driver's seat has the same slide adjustment (260 mm) and height adjustment (58 mm) as the outgoing model **with stepless adjustment**.

As the direct driver interface with the car, the new driver instrument cluster contributes to the new Mazda6's 'sporty and emotional' appeal. The blackout metres (depending on grade) have aluminium-look ring surrounds, new amber-red illumination circled by indirect blue lighting, white needles and characters with optimised spacing and size to be easily read and which give the cockpit a look of quality and precision.

New Audio Lighting System

Complementing the 'Welcome Mode' system, a new 'Action Illumination' system with blue lighting greatly enhances the feeling of quality of the front compartment at night. When turning the audio power switch, the audio buttons illuminate to maximum brightness, and then dim to their usual brightness. When power is switched off, the illumination is maximized in brightness and then the lights fade gradually. They also give intuitive feedback when pressed directly (either from the steering wheel or at the instrument panel) for CD fast forward/reverse, CD track up/down, radio seek and power on/off. When one of these mode buttons is pushed, the blue light along the inner edge of the button flashes for confirmation. When UP operation is pressed, the upper half of the panel flashes, when DOWN is pressed the bottom half of the panel flashes. When in fast forward mode, the right half of the panel flashes, and in reverse, the left half flashes. When 'mute' is selected, all of the lights flash.

The front seats are more comfortable and have a newly-designed frame. They have optimised cushion contours and firmness, with seatbacks that supply good lumbar support for long distance comfort, and optimised side panels for good support during sporty driving. New seat heaters are introduced as well, with two manually-operated settings (high and low) and **a new thermistor-type temperature sensor** that prevents undesirable temperature changes. **The back seats** have optimised cushion thickness for just the right amount of give for a comfortable fit for all types of occupants.

There is also a **new heating, ventilation and air conditioning (HVAC) system** designed with separate temperature controls for the driver and front passenger. The size of the heat exchanger is increased by 20 percent, the compressor capacity from 120 to 175 cc and airflow resistance is reduced by 40 percent in the ducts and HVAC. This translates into a measured airflow increase of approximately 10 percent and a 1 dB reduction in blower noise.

The new Mazda6 has a **completely new luggage compartment design**, with one of the segment's widest rear openings – 1,066 mm (for the estate version). Even more importantly, for the first 700 mm from the opening inward, Mazda6's boot is one of the widest in this segment, at 1,146 mm. This means that loading heavy suitcases requires less effort because they can be stowed close to the tailgate/boot opening, not further toward the rear seats. The boot volume with all seats up is between 510 litres (Hatchback) and 519 litres (Estate/Sedan). And of course the new Mazda6 inherits the acclaimed Karakuri rear seat-folding system. Just pulling a latch in the boot side trim panel automatically folds the 60/40 rear seats down (hatchback and estate) with no need for troublesome opening of the rear doors or removing the head restraints. To this is added a **new Karakuri tonneau cover** that automatically moves up and down with the liftgate (for the estate). With the rear seats down, the new Mazda6 has a load floor length that is 45 mm longer for the estate (1,926 mm). The hatchback load floor is 39 mm longer (1,879 mm) and this model has a VDA load volume floor-to-ceiling of up to 1,702 litres.

Quieter than Ever Before

The new Mazda6 is not only more comfortable and easier to use; it is quieter than ever before (-2.5 dB from 70 dB to 67.5 dB at 60 km/h on a rough road). NVH engineers improved the sound-absorbing properties of exterior panels, the mechanical parts and the interior trim. They also expanded the areas and shapes of sound-absorbing materials in the engine compartment and used Thinsulate™ in the roof headlining for superior sound absorption, all of which **lowered cabin noise considerably**. **Wind noise has been reduced** by optimising the shapes of the A-pillars, the door mirror shapes, and making the peripheral sealing of the doors more tight – with shapes that also help reduce the changes in noise levels as speed increases. **Road noise has been greatly reduced** as well by employing several new measures to lower the body shell's acoustic sensitivity and reduce road noise transmission via the suspension. These measures include:

- new instrument cowl panel, new dash panel and roof reinforcements to lower vibration transmission into the cabin,
- a revised centre floor structure with new and thicker damping material for less sound radiation from below,
- improved tilt resistance of the wheels for less vibration transmission from the road,
- new dual mode dynamic dampers on the front suspension upper arms for less lateral tipping and vibration,
- dynamic dampers on the rear knuckles for less torsion and road vibration transmission.

And finally**, engine noise of the new, top of the line MZR 2.5-litre petrol has been strictly controlled** to make sure that its increased power does not mean an increase in noise and vibration. For instance, engineers employed low-weight pistons and connecting rods, which reduce secondary inertia forces (cutting noise and vibration) to some of the lowest in the segment. They combined these with a **dual-mass damper and a flexible flywheel** to suppress combustion noise during acceleration. The flywheel has a flexible joint between the crankshaft and the flywheel that lowers the resonance (and the engine noise associated with it) in the 2,000 – 5,000 rpm range where the engine typically operates.

Convenience – four equipment grades for each body style

The new Mazda6 has plenty of convenient storage compartments and an expanded list of equipment that make it practical and easy-to-use on a daily basis. For small item storage there is a large 8.4 litre glovebox, a large centre console box with cupholders in front, cupholders in

the fold-out centre arm rest in the rear and front door trim pockets that can hold a drink bottle and documents. Mazda's Advanced Keyless Entry and Start System is also fitted (depending on market and grade). This uses a fob-type key that automatically unlocks the door when carried, and now includes a push start/stop ignition button in the instrument panel for even more convenience. A Bluetooth® mobile phone system (depending on market and grade) is available that uses a single button on the steering wheel and includes voice recognition in seven European languages (English, German, French, Spanish, Italian, Dutch and Portuguese). Also available is an 8-speaker premium Bose® audio system with digital amplifying technology for superior sound to each individual seat and an Audio Pilot® system that automatically adjusts tone characteristics to cancel out cabin noise at any particular moment. A navigation system featuring a touch-screen, a voice command and a 7-inch split display is also available.

Evolving the Human-Machine Interface

The second-generation Mazda6 uses a cross-functional network (CF-Net) that allows multiple onboard systems to communicate with each other so that their functions are optimally coordinated. CF-Net is a user-friendly control system for audio, navigation, climate control, driving info system and Bluetooth® on the steering wheel. This is more steering wheel control functionality than any Mazda vehicle ever. And it enhances safety by allowing the driver to operate all these onboard systems without taking his hands off the wheel and minimises how long he has to take his eyes off the road.

The second-generation Mazda6 will be offered in **four equipment grades** (depending on market). Standard for **Base grade models** are body-colour electric door mirrors, 16-inch alloy wheels, manual air-conditioning, tilt/telescopic steering wheel, CD/MP3 audio system with four speakers, front and rear power windows, six airbags, dynamic stability control (DSC), traction control, brake assist, active front head restraints, auxiliary jack and print antenna. For **Mid-grade models**, standard equipment includes the addition of foldable heated door mirrors, 17-inch alloys, CF-Net steering switches, 6 CD-changer/MP3 audio with six speakers, dual-zone automatic air-conditioning, leather steering wheel and shift knob, trip computer, auto dimming interior mirror, rain and light sensor system, front fog lamps and cruise control.

Top-of-the-range versions can be either Sports or Luxury oriented. **Sports-grade models** have all of the above, plus 18-inch alloys, a premium BOSE® audio system, Bi-xenon head lamps, adaptive front lighting system (AFS), tyre pressure monitoring system, Bluetooth® mobile phone system, exterior sports appearance package (SAP), half leather heated seats and an alloy pedal set. For **Luxury-grade models**, all previous equipment is included as standard (except the SAP kit), with additional full leather seats and parking sensor system.

The leather trim offer aboard the Mazda6 is in 3 different colors: a classical black like on the previous model, a light and sporty grey and a trendy color named "Misty Green".

4. Powertrains

New MZR 2.5-litre Petrol

- **New MZR 2.5-litre petrol that is more fuel efficient and powerful than previous 2.3-litre petrol**
- **Two other petrols and turbo diesel now with lower fuel consumption**
- **Five-speed automatic transmission**

The second-generation Mazda6's engine line-up features a new MZR 2.5-litre petrol engine with high torque for strong acceleration, smooth power development and cultivated high-speed cruising.

New MZR 2.5-litre Petrol – fuel-efficient + exceptional response from generous torque

Despite having a larger displacement, the MZR 2.5-litre petrol uses over half a litre less petrol per 100 km and produces fewer emissions than the outgoing, smaller MZR 2.3-litre petrol. To keep fuel consumption down, advanced engine control technologies were employed. These included optimising the EGR ratio, idle speed, partial load, and engine oil characteristics for reduced engine friction.

New MZR 2.5-litre Petrol

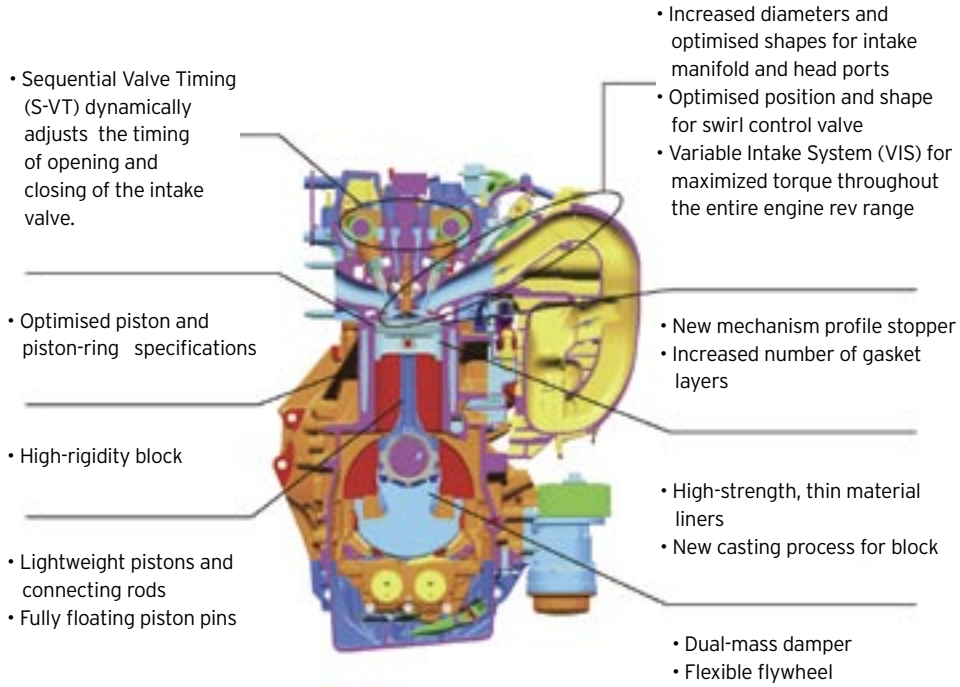
Topping the new Mazda6 engine line-up is a new MZR 2.5-litre petrol derived from the former model's 2.3-litre power unit. Though it has a larger bore and stroke, it is engineered with a smaller bore pitch and an unchanged block height, which gives it the same compact size and low weight as the 2.3-litre petrol. It produces more maximum power of 125 kW/170 PS (+ 4 PS) at 6,000 rpm and maximum torque of 226 Nm at 4,000 rpm – about 10 percent (+ 19 Nm) more torque at low to mid engine speeds than the 2.3-litre. It features lightweight pistons and fully floating piston pins, which offset the increased secondary inertial weight created by a larger bore and stroke. It has a high-rigidity block that reduces noise produced by increased combustion load, and minimised crankshaft vibration with the introduction of a dual-mass damper and a flexible flywheel. These factors contribute to smooth, quiet power delivery and cultivated driving fun (for engine noise reduction details see page 25 above).

This new engine is highly efficient. It uses sequential-valve timing (S-VT) to adjust the timing of valve opening and closing for optimised operation at all engine speeds. High power and torque are realised by improved flow characteristics in the intake ports. This is achieved by making the diameters larger and optimising the shapes of the intake manifold and head ports, by optimising the position and shape of the swirl control valve and by introducing a variable intake system (VIS) which maximises torque at all engine speeds. Exhaust resistance has also been reduced by optimising efficiency in the exhaust manifold, which optimises engine output even further. Low noise operation was realised by increasing the

length of the pipe within the main silencer, which limits the exhaust noise level at low engine speeds.

The combination of these new components and technologies results in a new top-of-the-line petrol engine that is more powerful and fun to drive than the previous 2.3-litre. With this engine, the sedan sprints from 0-100 km/h in just 8.0 seconds with a top speed of 220 km/h and uses only 8.1 litres of fuel per 100 km on the combined cycle – 0.6 litres less per 100 km than the previous 2.3-litre, which represents a 6.9 percent improvement.

Technologies in MZR 2.5 Engine



MZR 1.8-litre and MZR 2.0-litre Petrols, and MZR-CD 2.0-litre Diesel

The second-generation Mazda6 inherits three engines acclaimed for their spirited, reliable and frugal natures from the previous model, all of them updated to use less fuel than before. The most popular engine of the line-up is onboard: the MZR-CD 2.0-litre common-rail turbo, which still comes with a diesel particulate filter system as standard. This four-cylinder, 16-valve, SOHC engine now comes in a single power version that uses second-generation common-rail direct injection with up to 1,800 bar injection pressure and multi-stage injection of up to six times per cycle for superior combustion efficiency. Several engine technologies ensure smooth operation similar to a petrol engine. Its intake shutter valve reduces air intake by approximately 25 percent at idle, which effectively eliminates idle knock. It has a relatively low compression ratio of 16.7 : 1, which minimizes engine speed fluctuation and vibration, and it uses a dual-mass flywheel.

The new Mazda6's MZR-CD 2.0-litre turbo diesel produces 103 kW/140 PS of maximum power at 3,500 rpm and 330 Nm of maximum torque at just 2,000 rpm, for lively engine performance and responsive driving fun. It has a variable-geometry turbocharger with low inertial moment and a very compact design that achieves a shorter distance between the exhaust gas inlet and the turbine shaft. This results in quicker acceleration, high power and torque and a top speed of 204 km/h. Combined with the new Mazda6's sleek body and low coefficient of drag, this lively turbo diesel requires just 5.6 litres of fuel per 100 km on the combined cycle (sedan) – 0.4 litres less than the previous 2.0-litre diesel high power (sedan), achieving a 6.7 percent improvement.

Also carried over from the previous model are two MZR petrol engines in 1.8-litre and 2.0-litre displacements, both now more fuel-efficient than before. The 2.0-litre produces 108 kW/147 PS of maximum power at 6,500 rpm and maximum torque of 184 Nm at 4,000 rpm. It features electronic throttle control for great drivability, VIS that optimises the charging effect in the intake manifold according to engine speed by varying the length of the intake passages, and S-VT to ensure optimum power delivery throughout the rev range. On the road, the sedan with this engine has a top speed of 214 km/h and sprints from 0-100 km/h in 9.9 seconds, while using just 7.0 litres of petrol per 100 km combined – 0.8 litres less than the previous 2.0-litre petrol (sedan) for a 10.3 percent improvement.

The MZR 1.8-litre base engine also has VIS and an electronic throttle. It produces 88 kW/120 PS of maximum power at 5,500 rpm and maximum torque of 165 Nm at 4,300 rpm, while using just 6.8 litres of petrol per 100 km combined (sedan) – 0.9 litres less than the previous 1.8-litre petrol (sedan) to record an improvement of 11.7 percent.

Manual Transmissions – optimised high-mount shift lever operation

The new Mazda6 retains the five-speed (1.8-litre petrol) and six-speed manual (2.0, 2.5-litre petrols and 2.0-litre turbo diesel) transmissions from the previous model. Shift

effort for both manual transmissions has been reduced by Mazda6's higher positioned shift lever for easy shifting. The lever assembly's **base plate is also more rigid and hard stoppers introduced for a quality shift feel.** A balance between smoothness and stiffness is realised by tuning the control cable and the stoppers, while a newly-optimised counterweight inertia moment makes operating feel precise and light. Shifting at high speeds is also improved by making the fifth and sixth gear synchronizers larger, resulting in 15 percent less shift effort compared to the outgoing model's manual transmissions.

Five-speed Automatic Transmission

With the new Mazda6, a five-speed automatic transmission is available (for MZR 2.0-litre petrol only) with manual shift mode. The system has a slope-control function that selects gears according to the upward or downward slope of the road, and it is able to evaluate both the curviness of the road and driver's intentions, to deliver a linear and lively shift feel in all gears and on all kinds of roads.

5. Chassis & Safety

Sporty, Predictable and Safe

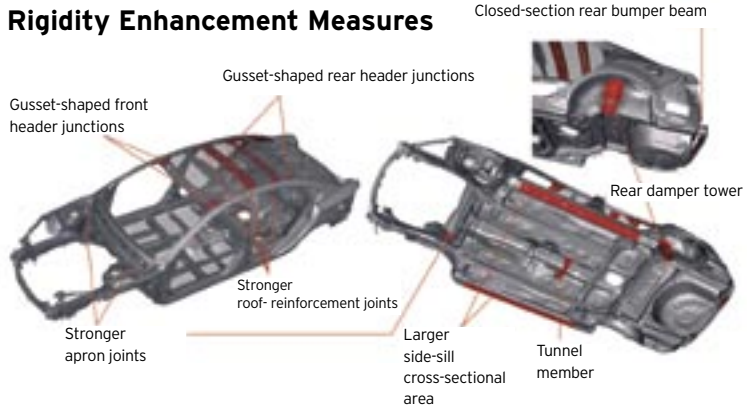
- **Double-digit percentage increase in body shell stiffness for improved handling and crash safety**
- **Six-mounting-point front suspension, single-pivot lower arms and electric power assist steering for improved handling and steering**
- **One of the lowest coefficients of drag in the C/D-segment, just Cd 0.27 (sedan/hatchback)**
- **Larger dimensions, but lighter**

Mazda6's newly-developed chassis systems are where two key values of the new model come together. First of all, they translate engine power to the road in a way that is 'emotional and sporty', meaning that the Mazda6 is a real driver's car. Secondly, the chassis also delivers one-with-the-car handling with superior ride comfort and steering attributes for a truly 'exclusive experience' behind the wheel. These are both key factors in ensuring that the Mazda6 will continue to be one of the best in its segment in Europe.

High Body Rigidity

The second-generation Mazda6 has a body shell that is much stiffer than the outgoing model's, with local reinforcements to specific body parts for improved dynamic performance and safety. Various local reinforcements were introduced (see box below) that have resulted in **a drastic improvement in flexural rigidity** compared to the outgoing model (+ 32 percent for the sedan, + 45 percent for the hatchback, + 33 percent for the estate). **Torsional rigidity has been improved as well** (+ 14 percent for the sedan, + 30 percent for the hatchback, + 25 percent for the estate).

Rigidity Enhancement Measures



As was the case with the third-generation MX-5 and the new Mazda2, engineers **increased the use of high-tensile and ultra-high-tensile steels** – by 7 percent (from 42 percent to 49 percent) – over the outgoing Mazda6, for superior strength and impact resistance, without an increase in weight.

Though larger and better equipped, new Mazda6 is lighter than the outgoing model

Mazda is the first carmaker to break the upward spiral of increasing the weight of every new vehicle. It strictly controlled the weight of its two most recent new products (MX-5 and Mazda2) and also employed a weight-saving programme for the all-new Mazda6. As a result of these measures (for details see box) the new Mazda6 – despite being larger, more rigid and featuring more equipment – is up to 2.4 percent lighter (- 35 kg, sedan with the MZR 2.5-litre petrol). This weight reduction, combined with aerodynamic improvements, engine tuning and technologies, delivers a decrease in fuel consumption for all engines in all three body types.

Sustainable Zoom-Zoom - controlling vehicle weight

Mazda is actively moving to make their vehicles more fuel-efficient to produce less CO_2 emissions, and doing this without diminishing the Zoom-Zoom driving experience that customers expect. One of the best ways to do this is by reducing vehicle weight. With the new Mazda6, this was especially challenging since the new car is longer, wider, taller, has a longer wheelbase, has a stiffer and safer body shell and more interior equipment. However, these increases were offset by a 7 percent increase (by weight) in the use of high and ultra-high tensile steels throughout the body shell. By using the latest impact-simulation technology, body shell engineers were able to optimise local reinforcements for strength and to lower weight. Weight was also saved by conferring sound-absorption properties on exterior body panels and parts, and on interior trim parts. Lightweight engine parts were employed as well.

Front suspension – new six-point mounting system

The new Mazda6 employs a high-mount double wishbone front suspension, similar to that of the outgoing model, but with some major improvements. It now has six (rather than four) perimeter frame mounting points, the two new mounts connecting the perimeter frame and the body near the lower arm mountings. This system is better at dispersing suspension inputs, provides better support rigidity, absorbs small vibrations more effectively and increases the perimeter frame's rigidity as well. The front damper characteristics were changed to provide a strong one-with-the-car feeling to enhance even further the *Kizuna* emotional connection with the driver. For the new Mazda6, engineers were able to improve steering feel even further by changing the lower arm of the front suspension from a double-pivot to a single-pivot type. All of these measures result in improved handling, steering, ride comfort and less road noise transmission.

Rear suspension – revised positioning of trailing arm bushes and upright dampers

For the new model, Mazda's E-type multilink rear suspension underwent significant changes compared to the outgoing model. The rear dampers now adopt an upright layout. This provides linear, delay-free vehicle movement and a feeling of stability, even when the car is subjected to sudden disturbances from the road surface or side winds.

Rack-Drive Electric Power Assist Steering

In developing the steering system for the new Mazda6, engineers focused on evolving the steering precision of the outgoing model, while ensuring superior straight line stability and control at high speeds. These goals were achieved by introducing a highly efficient rack-drive electric power assist steering system, replacing the hydraulic power assist system of the outgoing model. The electric power assist steering provides a steering feel that is firmer and more resistant to external disturbances. With it, the new Mazda6 responds to steering inputs in a precise and predictable way (its ratio is 15.4 : 1) and it has only 2.87 turns lock-to-lock with a curb-to-curb distance of 11 metres (16-17 inch wheel based). The system's inertia and friction are both lower too, which contributes to a 2 percent decrease in fuel consumption.

Aerodynamic performance – one of the lowest coefficients of drag (Cd) in the segment

Mazda6's sporty exterior design is also a paragon of aerodynamic performance and efficiency. At an early stage of development, engineers evaluated a design model using an aerodynamic prediction programme based on vehicle

shape parameters to identify points of the exterior that could be improved. With this tool, they graphically created an 'aerodynamic-improvement model' so they could visualise the shapes. They then conducted a numerical-simulation analysis on both the design model and the aerodynamic-improvement model to visualise the differences in airflow over them.

The **aerodynamic team then began working with exterior designers** to revise the design model to deliver improved airflow. At the end of the process, wind-tunnel testing fine-tuned the shapes of body parts to achieve the maximum aerodynamic performance. The results of their work give the new Mazda6 one of the lowest Cd figures in the segment (just 0.27 for the sedan and hatchback, 0.28 for the estate) and reduced lift (CL). Locations on the upper body optimised for lowering wind drag include:

- the shape of the A-pillar, door mirror, C-pillar,
- making the rear lamps 'edge type,'
- placement of the boot-deck rear edge (sedan),
- shape of the liftgate top surface (hatchback, estate),
- shape of the front bumper corners,
- making the side sill protrude more to suppress side turbulence.

Features used to limit drag under the car and to reduce lift include:

- a radiator and engine undercover,
- introducing all-new ´horse-shoe´ shaped front tyre deflectors,
- optimising the shape of the bottom edge of the front mud guards,
- introducing a centre floor undercover (Europe only for high speed driving efficiency),
- fitting rear covers and rear tyre deflectors,
- optimising the shape of the bottom of the rear bumper.

This aerodynamic performance level enhances the driving performance at high speeds while improving the fuel economy and the CO_2 level.

Active Safety – Bi-Xenon headlamps, adaptive front lighting, tyre pressure monitoring and parking sensor systems

Several active safety features are introduced for the first time with the Mazda6, including new **high-intensity Bi-xenon headlamps** (depending on grade) and an **adaptive front lighting system** (AFS), which uses an additional 'bending lamp' that monitors steering wheel angle to illuminate more area in the direction of the turn. AFS delivers superior forward visibility at night at junctions where pedestrians or cyclists could cross the road and for driving on curvy roads. A new **tyre pressure monitoring system** is fitted (Sports and Luxury grades) that helps prevent tyre pressure from becoming too low or high, for optimised fuel consumption and for better protection against possible blow-out. A **parking sensor system** is also available (depending on grade) that uses four ultrasonic sensors in each bumper, 8 in total, to detect obstacles in those typical blind spots fore and aft. If detected, it varies a pattern of beeps to inform the driver of where and how close the car is to an obstacle. Also, the previously mentioned CF-Net (Cross-Functional Network) contributes to the active safety.

The new Mazda6 braking system ensures that the car decelerates in a way that is responsive and linear for a feeling of reassurance and control. Braking feel has been greatly enhanced and in Mazda testing the new system gives higher deceleration with less pedal effort and shorter pedal strokes. To achieve this, the ventilated front disc brakes are now larger, at 299 mm (+ 16 mm) than the previous model and have callipers with 57 mm single pistons. The rear discs remain the same size, at 280 mm, with callipers that have 34.9 mm diameter single pistons and incorporate a parking brake mechanism. These form the basis of four-wheel **ABS, brake assist, electronic traction control (TCS) and DSC (standard for Europe).** As a result, the braking distance (in Mazda testing on a dry surface, from 100 km/h) is 39.0 metres for the new model.

Passive safety – new front perimeter frame extension and active head restraints

Safety engineers used the latest impact simulation technologies to optimise the layout and shapes of the body shell's front side members, perimeter frame and cabin structure to achieve improved crash safety. In the engine compartment structure, they introduced a **new front perimeter frame extension** and extended the joints between the front side members of the perimeter frame, for a 10 percent improvement in impact-absorption compared to the previous model. They also introduced two new tunnel side members beneath the front passenger compartment and made extensive reinforcements to the underbody members and the side sills. An improvement in side impact resistance was also achieved with a further strengthening of Mazda's triple-H body structure. The layout and shapes for the B-pillars and roof reinforcements were optimised, and a new cross member added below the front seats. And at the rear, the new Mazda6 has side members now made of high-tensile steel, which have a larger cross-sectional area and are straighter. The entire rear end body structure is designed to disperse impact energy into the underbody members and into the side sills, which more effectively protects the fuel system.

On the inside, Mazda6 has new active front head restraints (standard in Europe) which lower the load on front seat occupants' neck during a rear impact. Added to this are three-point seat belts, with pretensioners and load-limiters in the front, six airbags, and brake and clutch pedals that do not intrude into the cabin during frontal impact to help prevent leg injuries.

Each rear outside seat has **ISOFIX child safety seat anchors and top tethers** and the cabin features impact-absorbing trim on the pillars and roof side rails to help mitigate head injuries during a serious collision. And for **pedestrian protection,** there is an energy-absorbing space between the bonnet and the engine, and structures for impact energy absorption in the cowl grille and fender brackets, which mitigate the chance of serious head injuries. And the new Mazda6 uses energy-absorption foam in front of the front bumper beam and plastic reinforcements at the bottom of the front bumper, which help lower the chance of leg injuries.

Compatibility and Recyclability

Mazda Motor Corporation continues to make its products more compatible with the environment. Mazda's weight-savings programme (see Introduction) has already yielded results. The all-new Mazda2's base 1.3-litre MZR engine produces just 129 g/km of CO_2 (combined cycle) which is 20 g/km and 13.4 percent less than the smaller outgoing MZR 1.25-litre petrol engine. With the introduction of the third-generation Mazda MX-5 in 2005, the CO_2 emissions value dropped from 210 to 174 g/km (for the 1.8-litre petrol) an improvement of 17 percent. For the new Mazda6 with the MZR 1.8-litre petrol, CO_2 emissions (combined cycle) are 161 g/km, down 11.7 percent versus the outgoing model (sedan).

At the same time, Mazda is working at lowering the impact of its vehicles on the environment during production and during the lifecycle of the vehicle itself. Measures taken here include:

- working to replace all air-conditioner refrigerants known as greenhouse gasses,
- development of an electrode-deposited undercoat in the paint process that lowers volatile organic compounds (VOCs) and CO_2 emissions during production,
- using low-VOC body seals,
- greatly reducing the use of lead, hexavalent chromium, cadmium and mercury,
- building cars that are 90 percent recyclable by standardising, using easy to recycle plastics and making vehicles with easy to dismantle reusable parts and materials.

6. Mazda6 Registrations

History 2002 – 2007

	2002	2003	2004	2005	2006	1-6/2007
Austria	1,855	5,977	4,524	2,514	4,333	1,762
Belgium & Luxembourg	986	2,975	1,745	920	631	430
Bosnia Herzegovina (sales)	13	50	31	15	48	29
Croatia	244	1,214	859	416	695	366
Czech Republic (sales)	649	1,427	817	553	582	304
Denmark	588	2,054	2,395	3,046	2,545	1,092
Estonia	364	852	617	590	800	573
Finland	1,067	3,569	3,114	2,743	2,982	1,873
France	1,328	3,909	3,499	2,144	3,075	1,513
Germany	13,155	31,524	24,457	18,776	21,936	9,160
Greece	181	1,736	2,232	1,768	1,847	877
Hungary	436	1,089	1,185	732	754	282
Ireland	608	2,284	1,747	1,432	1,051	1,099
Italy	790	5,097	8,020	6,467	5,690	2,224
Latvia	113	497	456	283	380	322
Lithuania	202	374	273	243	249	197
Macedonia (sales)	8	70	73	19	34	19
Netherlands	2,341	5,470	3,317	2,348	1,894	1,083
Norway	799	2,273	2,209	1,721	1,574	713
Poland (sales)	21	102	144	3	0	0
Portugal (sales)	223	1,380	1,461	831	833	336
Romania (sales)	20	133	190	71	110	80
Slovakia	183	336	189	175	205	65
Slovenia	211	610	478	348	245	116
Spain	1,387	4,660	5,205	4,203	4,245	2,023
Sweden	1,142	2,666	1,640	1,925	2,185	1,203
Switzerland	1,159	2,325	2,121	1,825	2,200	1,062
United Kingdom	6,308	14,423	15,487	14,902	13,984	7,574
Total	**36,381**	**99,076**	**88,485**	**71,013**	**75,107**	**36,377**