Mazda is promoting safety initiatives, aiming to achieve a safe and accident-free automotive society from the three viewpoints of vehicles, people, and roads and infrastructure.

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#### CSR Targets for FY March 2018

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<th>FY March 2017 targets</th>
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<tr>
<td>Safety</td>
<td>6.7 Consumer issues</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>① Further evolve, and expand the introduction of i-ACTIVSENSE, which is a series of advanced safety technologies developed in line with Mazda Proactive Safety, the Company’s safety philosophy.</td>
<td>① Introduced the evolved i-ACTIVSENSE (for Mazda3 (Axela), Mazda6 (Atenza), CX-3, CX-5). * Equipped with Advanced Smart City Brake Support, with an automatic brake system for pedestrians added, and Traffic Sign Recognition System, for reading traffic signs and displaying speed limits and other information.</td>
<td>① : Accomplished, △ : Nearly accomplished, × : Not accomplished</td>
<td>① Further evolve, and expand the introduction of i-ACTIVSENSE, which is a series of advanced safety technologies developed in line with Mazda Proactive Safety, the Company’s safety philosophy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>② Obtain high ratings in the new car assessment programs (NCAPs) of respective countries.</td>
<td>② Obtained the highest ratings in the new car assessment programs (NCAPs) of each country as follows: JNCAP Advanced Safety Vehicle (ASV) Technology Assessment: Axela (Mazda3) obtained “2016ASV++”, the highest rating. IHS Safety performance evaluations: CX-3, Mazda3 (Axela) and Mazda6 (Atenza) obtained “TSP+”, the highest rating. A-NCAP Collision safety performance evaluations: CX-9, Mazda3 (Axela) and CX-5 obtained “5/5”, the highest rating.</td>
<td></td>
<td>② : Accomplished, △ : Nearly accomplished, × : Not accomplished</td>
</tr>
</tbody>
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SAFETY INITIATIVES

Mazda’s Basic Approach to Safety

Aiming to achieve a safe and accident-free automotive society, Mazda promotes safety initiatives from the three viewpoints of vehicles, people, and roads and infrastructure.

In March 2007, Mazda announced its long-term vision for the technology development: “Sustainable Zoom-Zoom.” The basic policy of the vision is to “provide all customers who purchase Mazda vehicles with driving pleasure as well as outstanding environmental and safety performance.”

In August 2017, a decade after the original and in light of the rapid changes taking place in the automotive industry, Mazda announced “Sustainable Zoom-Zoom 2030.” This new vision for technology development takes a longer-term perspective and sets out how Mazda will use driving pleasure, the fundamental appeal of the automobile, to help solve issues facing people, the earth and society (see pp. 4-6). Mazda believes its mission is to bring about a beautiful earth and to enrich people’s lives as well as society. The company will continue to seek ways to inspire people through the value found in cars. In the realm of society, which encompasses safety, “Sustainable Zoom-Zoom 2030” demonstrates Mazda’s determination to leverage cars and a society that provide safety and peace of mind, to create a system that enriches people’s lives by offering unrestricted mobility to people everywhere.

Initiatives in Vehicles

Mazda will address the issue of traffic safety, which requires a multi-faceted, balanced, and comprehensive approach, by providing all its customers with excellent safety performance, through vehicle engineering, the field in which Mazda can take the initiative.

While continuing to keep up with the cutting edge of safety advancements, Mazda has been working to make safety technologies both more functional and more economical, believing that these technologies will demonstrate their true value only when their use becomes widespread.

Mazda Proactive Safety: Mazda’s Safety Philosophy

Mazda’s safety philosophy, which guides the research and development of safety technologies, is based on understanding, respecting and trusting the driver.

To drive safely it is essential to recognize potential hazards, exercise good judgment and operate the vehicle in an appropriate fashion. Mazda aims to support these essential functions so that drivers can drive safely and with peace of mind, despite changing driving conditions. Since drivers are human beings, and human beings are fallible, Mazda offers a range of technologies which help to prevent or reduce the damage resulting from an accident.
By providing a good driving environment and excellent handling stability to support the drivers’ safer driving, Mazda aims to maximize the range of ordinary driving conditions in which the driver can concentrate on driving without anxiety or stress. If the risk of an accident increases, the sensing functions on the vehicle provide hazard alerts to help the driver avoid danger, thereby supporting safer driving. Moreover, understanding that human nature means that mistakes or errors cannot be totally eliminated, Mazda offers safety functions on its vehicles that help prevent such human errors as much as possible, and if an accident occurs, help prevent the accident or reduce the resulting damage. While implementing measures appropriate for each accident risk so as to reduce the risk as soon as possible, Mazda places the highest focus on improving ordinary driving conditions to remove possible causes of an accident rather than on a “what if”-based approach (preparing for possible results). Through providing these safety technologies based on a respect and understanding of human nature, Mazda supports safer and secure driving.

Continuously Evolving Basic Safety Technologies as Standard for All Vehicles

Aiming to achieve a safe and accident-free automotive society, Mazda promotes continuous evolution of basic safety technologies, such as the ideal driving position and pedal layout, excellent visibility, and active driving display, and will install these in all vehicles as standard.

Ideal Driving Position

In the new-generation models*, the major driving operation devices, including the pedals and the steering wheel, which are interface between man and vehicle, are located in an ideal position for a driver to operate them with ease and without fatigue.

Pursuing the Ideal Joint Angle for Comfortable Driving
The driving position is designed based on the theory of the “comfortable joint-link angle,” the joint angle at which the driver of any physical type can exert strength quickly and properly. One such example is Demio/Mazda2 equipped with a telescopic steering wheel* as standard equipment, which is a rare case in the segment of compact car.

Ideal Pedal Layout

The front wheels were repositioned farther forward and pedal shapes and spacing were optimized to realize a pedal layout that enables the driver to extend their leg and reach them more naturally. This helps enable finer pedal control and smooth foot transfer to the brake pedal. It is an ideal pedal layout that allows comfortable operation, even on long drives, and contributes to error-free operation, even when braking in an emergency.

Organ-Type Accelerator Pedal

With an organ-type accelerator pedal, the driver’s heel is placed on the floor, and the driver’s foot and the pedal follows the same trajectory. This makes accelerator pedal control easier because the heel position is stabilized. The accelerator pedal is positioned where the driver’s foot naturally rests while sitting in the seat. This reduces both driving fatigue and the chances of the driver stepping on the wrong pedal when reacting quickly.

*1 The new products that have incorporated Mazda's innovative base technology SKYACTIV TECHNOLOGY and Mazda’s new design theme “KODO—Soul of Motion” Applied models (as of June 30, 2017): Demio/Mazda2, Axela/Mazda3, Atenza/ Mazda6, CX-3, CX-4, CX-5, CX-9, Roadster/MX-5
*2 A mechanism to move the steering wheel back and forth.
Excellent Visibility

In the new-generation models\(^1\), Mazda considers it important to secure good visibility to help the driver prevent accidents by supporting his/her ability to predict and avoid his/her surroundings, such as road environment, other vehicles, obstacles, and pedestrians including children. The A-pillar is positioned about 100 mm rearward from its position in the previous model to expand the visible angle from the front seat by 1.8 degrees to both the right and the left. Moreover, to expand the vision through the door mirror so as to improve the visibility of pedestrians and obstacles, door mirrors are installed on the outer door board in a lower position. Visibility for children is specially cared.

"HMI Concepts" to Minimize Causes of Careless Driving

Human Machine Interface (HMI) refers to the equipment and mechanisms to facilitate transmission of various information between the driver and the vehicle. Mazda’s HMI helps drivers to maintain a stable driving position and concentrate on driving safely, even while dealing with a variety of information. The thoroughly human-oriented cockpit design enables the driver to concentrate during driving and minimizes the three factors that cause careless driving: inattentive looking, inattentive thinking, operation in an unstable position. Mazda has adopted this cockpit design in the new-generation models\(^1\) since 2013.

Concept: Heads-Up Cockpit

In designing the cockpit, Mazda places importance on ensuring that various information communication functions are used safely and comfortably. Aiming at helping the driver concentrate on driving safely in a correct posture while dealing with many kinds of information, this HMI concept has achieved minimum visual distraction and posture change.

- Simple cockpit with information sorted and placed in different zones
- A 7-inch center display installed on the dashboard, enabling the driver to view it without lowering his/her eyes much\(^{(1)}\)
- Commander control pursuing operation that does not require a visible check of the driver’s hand movements\(^{(2)}\)
- Active driving display to present vehicle speed, navigation route and other information as an image in front of the meter hood\(^{(3)}\)
- A voice-recognition system to control the functions by voice is also available.

**Third Party Safety Evaluations**

**Rating by vehicle model** (As of August 31, 2017)

<table>
<thead>
<tr>
<th></th>
<th>CX-5</th>
<th>Atenza/Mazda6</th>
<th>Axela/Mazda3</th>
<th>Demio/Mazda2</th>
<th>Roadstar/MX-5</th>
<th>CX-3</th>
</tr>
</thead>
</table>

**Change in rating in the last three years**

<table>
<thead>
<tr>
<th></th>
<th>2014(^{+1})</th>
<th>2015(^{+2})</th>
<th>2016(^{+3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe Euro-NCAP(^1)</td>
<td>4-Star (2017)</td>
<td>0-Star (2017)</td>
<td>0-Star (2017)</td>
</tr>
</tbody>
</table>

\(^{+1}\) Japan New Car Assessment Tests: Vehicle collision safety performance evaluations conducted by the National Agency for Automotive Safety and Victims’ Aid. For collision safety performance, 5-Star is the highest possible rating (From 2016).

\(^{+2}\) National Highway Traffic Safety Administration’s 5-Star Safety Ratings program. 5-Star is the highest possible rating.

\(^{+3}\) Insurance Institute for Highway Safety: Safety performance evaluations by an independent, nonprofit organization funded by auto insurers. Top Safety Pick + (Plus) is the highest possible rating.

\(^{+4}\) European New Car Assessment Programme: An independent agency comprised of the transport authorities of European countries, etc. 5-Star is the highest possible rating.

\(^{+5}\) New-generation models were the target of evaluation.

\(^{+6}\) Not introduced in the US as of August 31, 2017

\(^{+7}\) Not evaluated

\(^{+1}\)  The new products that have incorporated Mazda’s innovative base technology SKYACTIV TECHNOLOGY and Mazda’s new design theme “KODO-Soul of Motion”

\(^{+2}\) Applied models (as of June 30, 2017): Demio/Mazda2, Axela/Mazda3, Atenza/Mazda6, CX-3, CX-4, CX-5, CX-9, Roadstar/MX-5

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Mazda Sustainability Report 2017
Making Advanced Safety Technologies Standard

Aiming to achieve an accident-free motorized society, Mazda will continue to enhance its advanced safety technologies and work to make them standard equipment on all models. The Company also aims to make the “Mazda Co-Pilot Concept,” which uses autonomous driving technologies and allows drivers to enjoy any drive with peace of mind, standard equipment by 2025.

i-ACTIVSENSE Advanced Safety Technologies

Mazda’s i-ACTIVSENSE is an umbrella term covering a series of advanced safety technologies, developed in line with Mazda Proactive Safety. They include active safety technologies that support safer driving by helping the driver to recognize potential hazards, and pre-crash safety technologies which help to avert collisions or reduce their severity in situations where they cannot be avoided.

The Mazda Co-Pilot Concept: Human-Centered Autonomous Driving

The Mazda Co-Pilot Concept is Mazda’s development concept for human-centered self-driving technology. Based on this concept, people enjoy driving and are revitalized mentally and physically through the process. Meanwhile, the car knows all the movements of the driver and the car and is driving “virtually” in the background at all times. If the unexpected occurs, such as the driver suddenly losing consciousness, the car takes control to prevent endangering vehicle occupants and passersby. It also automatically contacts emergency services and drives safely to an appropriate location.

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**MAZDA CO-PILOT CONCEPT**

**When the driver’s condition is normal**

Under normal conditions, drivers can enjoy driving themselves while the car constantly monitors their condition and conducts “virtual driving,” meaning it is ready to drive itself at any time.

**When the driver cannot operate the vehicle in a normal manner**

When it is determined that the driver cannot operate the vehicle normally, the car overrides the driver to avoid collisions and moves to a safe location to stop the vehicle.
# i-ACTIVSENSE technologies

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Name</th>
<th>Effective when</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSM</td>
<td>Blind Spot Monitoring</td>
<td>Driving (changing lanes)</td>
<td>Alerts the driver to the presence of vehicles in the blind spot with an icon in the wing mirror. If the driver indicates to change lanes, the icon flashes and a warning beep sounds.</td>
</tr>
<tr>
<td>RCTA</td>
<td>Rear Cross Traffic Alert</td>
<td>Reversing</td>
<td>Alerts the driver with an icon in the wing mirror and a warning beep if it detects vehicles approaching from either side while backing out of a parking space or garage.</td>
</tr>
<tr>
<td>DAA</td>
<td>Driver Attention Alert</td>
<td>Driving</td>
<td>Monitors the vehicle’s behavior and recommends a rest stop if signs of driver fatigue or reduced concentration are detected.</td>
</tr>
<tr>
<td>TSR</td>
<td>Traffic Sign Recognition System</td>
<td>Driving</td>
<td>Automatically detects speed limits and indicates speed limit in the Active Driving Display.</td>
</tr>
<tr>
<td>AFS</td>
<td>Adaptive Front-Lighting System</td>
<td>Driving at night</td>
<td>Turns the headlights automatically to illuminate in the direction the driver is steering.</td>
</tr>
<tr>
<td>HBC</td>
<td>High Beam Control System</td>
<td>Driving at night</td>
<td>Detects oncoming traffic and vehicles in front, automatically switching between high beam and low beam settings.</td>
</tr>
<tr>
<td>ALH</td>
<td>Adaptive LED Headlights</td>
<td>Driving at night</td>
<td>Detects oncoming traffic and vehicles in front, automatically controlling the area illuminated by the high beams to maintain maximum visibility.</td>
</tr>
<tr>
<td>FOW</td>
<td>Forward Obstruction Warning System</td>
<td>Driving</td>
<td>Detects vehicles in front and warns the driver with a visual display and alarm if there is a risk of collision.</td>
</tr>
<tr>
<td>LDWS</td>
<td>Lane Departure Warning System</td>
<td>Driving</td>
<td>Warns the driver with a sound (or vibrating steering wheel) and a visual display if the vehicle starts to stray from its lane.</td>
</tr>
<tr>
<td>LAS</td>
<td>Lane-Keep Assist System</td>
<td>Driving</td>
<td>Provides steering assistance to return the vehicle toward the center of the lane if the driver starts to stray from the lane.</td>
</tr>
<tr>
<td>SBS</td>
<td>Smart Brake Support</td>
<td>Driving</td>
<td>Works at higher speeds to automatically apply the brakes when there is a risk of collision. This helps to avoid collisions or reduce the severity if one does occur.</td>
</tr>
<tr>
<td>SCBS F</td>
<td>Smart City Brake Support F</td>
<td>Driving</td>
<td>Works at lower speeds to automatically apply the brakes when there is a risk of collision. This helps to avoid frontal collisions or reduce the severity if one does occur.</td>
</tr>
<tr>
<td>Advanced SCBS</td>
<td>Advanced Smart City Brake Support</td>
<td>Driving</td>
<td>Works at lower speeds to automatically apply the brakes when there is a risk of collision. This helps to avoid frontal collisions or reduce the severity if one does occur.</td>
</tr>
<tr>
<td>AT</td>
<td>AT Acceleration Control</td>
<td>Driving slowly Acceleriating</td>
<td>Warns the driver with an alarm and visual display and curbs engine power if the accelerator pedal is pressed excessively while there is an obstacle in front of the car.</td>
</tr>
<tr>
<td>SCBS R</td>
<td>Smart City Brake Support R</td>
<td>Reversing</td>
<td>Automatically applies the brake to stop or slow the vehicle when there is a risk of collision with an obstacle behind.</td>
</tr>
<tr>
<td>MRCC</td>
<td>Mazda Radar Cruise Control</td>
<td>Driving</td>
<td>Measures the distance to the car ahead and controls speed to maintain a safer following distance.</td>
</tr>
<tr>
<td>MRCC</td>
<td>Mazda Radar Cruise Control with Stop &amp; Go function</td>
<td>Driving</td>
<td>Measures the distance to the car ahead and maintains a safer following distance. Now features stop &amp; go functionality.</td>
</tr>
</tbody>
</table>

TOPICS


Mazda Axela (Mazda3 overseas) obtained “ASV++,” the highest ranking in the preventive safety assessment of Japan New Car Assessment Program (J-NCAP)*1 of FY 2016, marking the highest score in evaluation of the automatic brake for pedestrians, a newly added assessment item.

The Axela, equipped with Advanced Smart City Brake Support (Advanced SCBS), detects vehicles and pedestrians in front with a camera, and automatically applies the brakes when there is a risk of collision. This helps to avoid collisions or reduce their severity if one does occur. Smart Brake Support (SBS), which works at middle or high speeds to avoid collisions or reduce their severity, and Blind Spot Monitoring (BSM), which alerts the driver to the presence of vehicles approaching from behind, are also adopted.

*1 Vehicle safety performance assessment released by the Ministry of Land, Infrastructure, Transport and Tourism, and the National Agency for Automotive Safety and Victims’ Aid (NASVA) since fiscal 1995, for the purpose of promoting the safe vehicles.

TOPICS

【Japan】i-ACTIVSENSE Advanced Safety Technologies to Be Standard Equipment

Mazda will apply i-ACTIVSENSE advanced safety technologies for nearly all new-generation models*1 sold in Japan as standard equipment by the end of FY March 2018. The aim of this initiative is to deliver safer, more reliable cars to a greater number of customers, from beginners to elderly drivers.

The i-ACTIVSENSE features to become standard under this initiative are: “collision damage reduction brake” to help prevent accidents likely to occur in daily driving or reduce the damage caused by such accidents; “AT Acceleration Control” to help reduce accidents caused by misoperation of the pedals in AT vehicles; “Blind Spot Monitoring (BSM)” to alert the driver changing lanes to the presence of vehicles diagonally behind; and “Rear Cross Traffic Alert (RCTA)” to detect vehicles approaching from the side when reversing in a parking lot.


*1 The new products that have incorporated Mazda's innovative base technology SKYACTIV TECHNOLOGY and Mazda's new design theme "KODO-Soul of Motion.

Applied models (as of June 30, 2017): Demio/Mazda2, Axela/Mazda3, Atenza/Mazda6, CX-3, CX-4, CX-5, CX-9, Roadster/MX-5

EMPLOYEE’S VOICE

Aiming to achieve both driving pleasure and safety performance, we are developing Mazda-unique safety technologies

I am in charge of designing parts for Advanced SCBS, an automatic braking system including for pedestrians. Developing the parts is difficult as we have to imagine the diverse driving situations of our customers all over the world to achieve higher safety. Advanced SCBS won the highest ranking in the preventive safety assessment in Japan for FY March 2016. This made me very happy because the high safety performance of the technologies we have developed is now proven, which has given us confidence for the future. I will make further efforts in developing Mazda-unique safety technologies that can achieve both driving pleasure and safety performance, thereby contributing to the realization of safer and reliable cars and society.

Akihiro Hisatsune
Integrated Control System Development Division
Technologies to Mitigate Injuries in an Accident

Passive safety technologies help mitigate injuries to the driver and passengers if an accident should occur. Mazda does not simply comply with the laws of each country and region and NCAP test, but also conducts tests*1 for various types of potential collisions that might occur on the road, and has made steady progress in developing passive technologies to better protect passengers and drivers. Major passive safety technologies are as follows:

**SKYACTIV-BODY:**
Mazda has developed SKYACTIV-BODY, a new-generation body structure with lightness and high rigidity, by revisiting the basic principles and reviewing every element of the structure, production method and materials.

**Multi-Load Path Structure**
Disperses the impact of a crash in multiple directions throughout the framework instead of absorbing it at specific portions.

**Bumper Beams**
The front and rear bumper beams adopt 1,800 MPa ultra-high tensile steel with the world's highest level of rigidity among mass production vehicles.

**Cross-Shaped Front Frame**
Based on the characteristic of the crash energy transferred mainly along the ridge lines of an object, the front tip of the front frame was molded into a cross shape, so as to increase ridge lines to twelve from four in a conventional square section. This helps the shock to disperse more widely, improving the energy absorption efficiency.

**Pedestrian protection:**
Mazda uses various methods to reduce injury to pedestrians in the event of a collision.

**Impact-Absorbing Bonnet**
To mitigate the impact and reduce injury if a pedestrian's head hits the bonnet (hood), an energy-absorbing space is created beneath the bonnet. An energy-absorbing structure is adopted in various parts, including the bonnet hinge.

**Impact-Absorbing Bumpers**
Energy absorbing materials are used in the front part of the vehicle which hits pedestrians' knees to mitigate the severity of pedestrian knee injuries, which may seriously affect their ability to walk. Also, stiffening reinforcement is placed at the bottom of the bumper to better prevent a pedestrian's leg from going under the vehicle.

**Active Bonnet**
At certain vehicle speeds, when sensors detect an impact exceeding a defined level, the rear end of the bonnet is raised. This creates a space between the bonnet and the engine which acts to absorb the energy of impact and reduces the severity of head injuries in collisions involving pedestrians. This design has been adopted since July 2012, for sport cars, such as Roadster/MX-5, whose bonnet is set in a low position.

Website on Technologies to Mitigate Injuries in an Accident

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*1 Collision test and evaluation, rollover test, roof strength test, etc.