REALIZING A MOTORIZED SOCIETY FREE FROM TRAFFIC ACCIDENTS

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

Three Viewpoints of Safety Initiatives

- **Vehicles**
  - Developing and commercializing safe vehicles
- **People**
  - Educating people about safety
- **Roads and infrastructure**
  - Participating in efforts to improve traffic environments

Mazda Proactive Safety: Mazda's Safety Philosophy

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 cannot be totally eliminated, Mazda offers safety functions on its vehicles that help prevent such human errors as much as possible, and if an error occurs, help prevent an accident or reduce the resulting damage.

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 driver's safer and more secure driving.

Initiatives in Vehicles

Mazda aim to realize a safer and accident-free automotive society by creating system where all people, wherever they live, can enjoy unrestricted mobility.

While continuing to further enhance its safety technologies, Mazda works on technology development with the belief that technologies will demonstrate their true value only when their use becomes widespread.
Continuously Evolving Basic Safety Technologies as Standard for All Vehicles

Aiming to realize an automotive society that offers safety and peace of mind, Mazda promotes continuous evolution of basic safety technologies, such as the ideal driving position and pedal layout, excellent visibility, and human machine interface, and will install these in all vehicles as standard.

Ideal Driving Position

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. For Mazda3, which was introduced in 2019, the adjustable range of the telescoping mechanism*1 has been extended and the driving position adjustment accuracy has been improved to provide the driver with a more comfortable driving position. The above design modification has reduced the tightness a small driver feels when he/she moves the seat forward. The front console layout has also been renewed. In particular, the cup holder position has been moved to the front of the shift lever.

Helping Drivers Assume the Ideal Driving Position

Mazda believes that the ideal driving position not only allows drivers to properly control a vehicle, but also can improve their handling in emergency collision avoidance and reduce injury to occupants even if a collision occurs. Therefore, the Company has offered driving position lectures by experts at the Mazda Driving Academy (P76) and other events.

The CX-60 has incorporated an automatic driving position guide so that many more people can drive the car in the driving position that Mazda considers ideal.*2 As one of the driver personalization systems, this feature perceives the driver’s physical build by detecting the positions of his/her eyes with a camera, as well as based on the body data that he/she has inputted in advance. Then this feature automatically adjusts the positions and angles of the driver’s seat, the steering wheel, the Active Driving Display, and the outer mirrors. The driver can also make fine adjustments on his/her own.

Image of comfortable joint-link angle

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**Ideal Pedal Layout**

The front tires and tire houses have been repositioned farther forward to realize an offset-free, ideal pedal layout where the driver can stretch his/her foot forward and naturally rest it on the accelerator pedal when he/she sits in the seat. The distance between the accelerator pedal and the brake pedal has also been reviewed and optimized. As a result, the driver can enjoy driving more comfortably for many hours in a relaxed posture while operating the pedals more smoothly.

These design improvements reduce both driving fatigue and the possibility of the driver stepping on the wrong pedal when braking in an emergency.

**Comfortable layout enabling easy operation**

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**In the case of an AWD car**

**Conventional rear-wheel-drive-based AWD platform**

**CX-60 AWD**

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**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. For the 2019 Mazda3, Mazda has developed a new organ-type accelerator pedal structure in which the pedal fulcrum is positioned more closely to the driver’s heel when compared with conventional accelerator pedals of this type. The new accelerator pedal minimizes the deviation of its trajectory when depressed, enabling the driver to use his/her calf muscles more efficiently.
Excellent Visibility
Mazda considers it important to secure good visibility to help the driver prevent accidents by supporting his/her ability to predict and react to his/her surroundings, such as road environment, other vehicles, obstacles, and pedestrians including children. To expand the vision through the door mirror so as to improve the visibility of pedestrians and obstacles, door mirrors of all Mazda passenger vehicles currently available on the market are installed on the outer door board in a lower position. For the 2019 Mazda3 and subsequent models, the visibility has been further enhanced by a combination of the inherent slenderness and the well-devised shape of the A-pillar. Visibility for children is especially cared.

Opening angle enlarged by improved A-pillar

Introducing the See-Through View Technology, which Helps the Driver Check the Surroundings
The See-Through View technology has been introduced in the CX-60 to allow the driver to check the surroundings with a stronger feeling of security. This technology uses a camera system that has the three functions of detection, identification and collision prediction. With this camera system, the technology complements the driver’s vision by displaying an image of the surroundings as if they are seen from inside the car in order to enable the driver to not only find an object or pedestrian as early as possible but also park or start the car without concern.

- Detection: Broadening the field of vision by integrating a front-view (or rear-view) image with part of a side-view image
- Identification: Making the integrated image show an object in a larger size and three-dimensionally so that it seems like a diagonal view (from the driver’s seat)
- Collision prediction: Displaying the outermost side of the car and its predicted line of course

*1 Some grade only
“HMI Concepts” to Minimize Causes of Careless Driving

Mazda has been committed to developing Human Machine Interface (HMI), which denotes equipment and mechanisms that facilitate communication of information about various things occurring during the drive between the driver and the vehicle, based on the concept “Heads-up Cockpit.” Equipped with thoroughly human-centered HMI, the cockpit is designed to minimize three risk factors for careless driving*1 (cognitive distraction, visual distraction, and manual distraction) to enable the driver to concentrate on driving.

The information necessary for driving is presented in order of priority so that the driver can concentrate his/her attention on driving and thus reduce cognitive distraction. Indications in front of the driver’s seat have been simplified to make the display easier to see and thus reduce visual distraction. Indicators and other intuitively operable devices are installed to reduce manual distraction.

Designing a cockpit that enables the driver to concentrate his / her attention on driving

1. Vehicle speed and other “active information that should be checked at every moment” are shown in the active driving display.
2. The amount of fuel and other “status information necessary for checking the status of the vehicle” are shown by meters.
3. Media information and other “information for comfort and convenience” are shown in the center display.

More Advanced HMI Based on an Enhanced Human-Centered Design Philosophy

The CX-60 is the first model to be equipped with HMI that features an advanced indicator system based on an enhanced human-centered design philosophy.*2 The most prominent advancement lies in the increased area of the Active Driving Display (ADD), which is three times larger than ADDs in preceding models, including the Mazda3. In response to the enlarged ADD, the indicator layout has also been reconstructed to make displayed information more recognizable and more quickly readable. More specifically, the indicators are laid out optimally, grouped more appropriately, and enlarged.

Optimal indicator layout

When Mazda Radar Cruise Control (MRCC) or other driving support systems start working, the indicator layout will change from the usual one. Now that necessary information is displayed in the optimal layout according to the situation, the driver can read the indicators in a minimum time in each setting and recognize the state of the vehicle intuitively.

Enlarged indicators

In order to provide a safer and enjoyable driving experience for drivers of various age groups, the size of letters and graphics has been increased to improve visibility.

1 The following are three factors that cause careless driving.
• Cognitive distraction: The driver is distracted by something other than vehicle control, such as checking the position of a switch and its operation method.
• Visual distraction: The driver takes his/her eyes off the road to check the information for other purposes.
• Manual distraction: The driver strongly moves his/her body and adopts an awkward posture to operate a device.

*2 Some grade only
i-ACTIVSENSE Advanced Safety Technologies

Mazda is committed to continuous evolution of i-Activsense advanced safety technologies, to deliver safer, more reliable cars to a greater number of customers, from beginners to elderly drivers. 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.

As a result of ongoing steady technological evolution, in 2020, two new safety features were added to the i-Activsense umbrella: a Smart Brake Support (SBS), and an Emergency Lane Keeping (Blind Spot Assist) (Road Keep Assist) (RLK). These new technologies have been adopted for the MX-30.

The Company has completed application of six technologies, including the collision damage reduction brake (Advanced Smart City Brake Support or Smart Brake Support) and an acceleration suppression device that functions when the driver depresses the wrong pedal (AT Acceleration Control), for all 12 major models sold in Japan, as standard equipment. Under the new vehicle safety concept “Safety Support Car S (Suppocar S)” recommended by the Ministry of Economy, Trade and Industry and the Ministry of Land, Infrastructure, Transport and Tourism, these models qualify for the “Wide” Suppocar S category (as of November 2022).

Driving Support Plus*, a System That Supports Safe Driving with an Electronic Key

Drivers in all age groups can cause an accident by stepping on the wrong pedal. To allow all drivers to enjoy driving with a feeling of security, Mazda has introduced Driving Support Plus, starting with the CX-60. If this new system detects the driver suddenly stepping on the accelerator pedal and judges this to be a pedal misapplication, the system will prevent the vehicle from suddenly accelerating and will reduce damage by suppressing the acceleration even if there is no obstacle in front of the vehicle, as well as informing the driver of the pedal misapplication with the warning buzzer and the indicator. Driving Support Plus is automatically started by unlocking the doors with the optional dedicated keyless entry system and starting the engine. In addition to AT Acceleration Control, this system helps prevent accidents caused by pedal misapplication and reduces damage from such errors.

*Conditions for system functioning*
- When the select lever is at any position other than “P” or “N”
- When the vehicle is moving forward at a speed of about 30 km/h or lower or reversing at a speed of 15 km/h or lower

*1 Warnings concerning Driving Support Plus
- Since Driving Support Plus is a driving support system, its functions have limitations. For your safe driving, please do not rely solely on this system. Excessive reliance on this system may expose you to danger of an unexpected accident. Be sure to confirm that the situation surrounding your vehicle is safe while you are driving.
- Please note that Driving Support Plus may not function in some situations.
- Driving Support Plus is not a collision prevention system. In addition, since it has no function of automatically stopping the vehicle, the vehicle will move by inertia even after the system functions. Be sure to check the surrounding traffic situation and apply the brakes on your own.
- Please do not test the acceleration control function of the system by trying suddenly stepping on the accelerator pedal on your own. The system may not properly function in some situations, exposing you to danger of an unexpected accident.

Human-centered Advanced Driving Support Technology

Mazda Co-Pilot Concept

The Mazda Co-Pilot Concept is Mazda’s unique concept for human-centered advanced driving support 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 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 help prevent an accident and reduce potential injuries. It also automatically contacts emergency services and drives to a safer location.

The Company aims to develop technologies of the Mazda Co-Pilot Concept, which uses autonomous driving technologies to allow drivers to enjoy any drive with peace of mind, and make these technologies standard.
Driver Monitoring (DM)
For Driver Monitoring (DM), which was introduced in the Mazda3 in 2019 for the first time, two new functions have been added: step-by-step warnings issued when the driver’s drowsiness is detected, and an earlier frontal collision warning issued when careless driving is detected. More advanced technologies are applied to the CX-60, detecting drowsy driving with the driver’s eyes closed and noticing a sudden change in the driver’s condition based on changes in his/her posture or the position of his/her head, in addition to issuing a warning against careless driving. The accuracy of DM’s detection of both drowsiness and changes in the driver’s condition has been increased through comprehensive judgment based on various factors, including the state of driving.

Detecting the driver’s condition by Driver Monitoring

Driver Monitoring (DM)

| Step 1-1: | After detecting an abnormality in the driver’s condition, start the hazard lights blinking to inform the passenger that the vehicle will make an emergency stop soon |
| Step 2: | If the driver cannot resume driving, slow down and stop the vehicle while blinking not only the hazard lights but also the brake lights and sounding the horn repeatedly |
| Step 3: | Automatically make emergency contact with an external party as needed |

Steps in the operation of the DEA system

The CX-60 is the first model to be equipped with the Driver Emergency Assist (DEA) system based on an advanced safety technology that can detect abnormalities in the driver’s condition to help avoid an accident or reduce damage and injuries. Working with Driver Monitoring, the DEA system will slow down and stop the vehicle if it becomes difficult for the driver to continue to drive due to a sudden sickness or for other reasons, regardless of whether the vehicle is running on an expressway, an automobile road, or an ordinary road. This system therefore helps avoid an accident or reduce accident damage and injuries.

Some functions of the DEA system are available only for customers who have contracted for the connected services and inserted an SD card in their navigation system.
Technologies for Mitigating Injuries and Damage from an Accident

In anticipation of an accident, Mazda has been developing technologies for mitigating injuries to the driver, passenger, and pedestrians and damage to other vehicles involved in the accident, mainly focusing on analyzing various real cases of accidents and various forms of accident-caused injuries and damage in the market, as well as human-engineering mechanisms for causing injuries to human bodies.

The Company has been dramatically enhancing the collision safety performance of Mazda vehicles by utilizing a sturdy body structure that can absorb energy more efficiently and minimize cabin deformation in the event of a collision in any of the various directions and a protective structure developed based on the human characteristics of drivers, passengers, and pedestrians to reduce injuries to them from various kinds of accidents. Mazda's major safety technologies are described below.

Lightweight collision-safety body:
Mazda has developed a sturdy vehicle body structure that can absorb energy more efficiently by introducing highly strong material for pillars and frames, reinforcing skeleton joints, and designing the optimal forms of skeleton joint sections. This body can absorb and disperse impacts in various directions to support the cabin and mitigate its deformation.

Occupant protection:
Mazda has developed a technology for reducing injuries based on research on the human characteristics of people who are different in terms of build, including elderly people. Mazda vehicles use an occupant-protection structure in anticipation of various forms of accidents and injuries.

Pedestrian protection:
As a technology for mitigating injuries to not only drivers and passengers but also pedestrians in the event of an accident, Mazda vehicles use a pedestrian-protection structure designed in anticipation of injuries in various spots in pedestrians' bodies.

Technologies Introduced in 2022 for the CX-60 and subsequent models
The following technologies have been used in the CX-60, which was launched in Europe in April 2022.

Lightweight Collision-Safety Body

Ultrahigh-tensile steel plate
The percentage of steel panels with an ultrahigh tensile strength of 980 MPa or more used in a vehicle has increased from about 13% for the previous model to about 21% for the CX-60. The CX-60 is Mazda’s first model to use 1,470-MPa-class cold-stamped steel and 1,800-MPa-class hot-stamped steel for body structural parts, thereby achieving light weight.

Frontal collision safety performance
The bumper beam and the perimeter beam have been elongated at both sides to protect the vehicle from a collision in any of the various directions and reduce damage to other vehicles involved in the collision.

Side collision safety performance
A highly strong underbody structure is used to provide a protective space for the drive battery under the floor in anticipation of a collision against a tree, a utility pole, etc.

Occupant Protection

Front seat
To reduce possible neck injuries from a rear-end collision, the front seats are designed not to lean backward at the initial stage of the collision, using seat frames with increased rigidity and bend-resistant seat sliders. In addition, the seat back cushions, featuring the optimized hardness of each part, are designed to securely hold the head as early as possible to mitigate the opposite-direction movements of the head and the torso.

Seatbelt lap anchor
To minimize the slack of the belt irrespective of the forward-backward position of the seat, the lap anchor of each front seat is now attached to the seat, instead of the floor, to which the previous type of lap anchor was attached. This change helps the seat firmly hold the occupant’s body as soon as possible in the event of a collision.

Driver’s seat knee airbag
The driver’s seat knee airbag has been introduced to protect the front parts of the driver’s knees. It helps to prevent the driver’s body from moving forward to reduce possible injuries to his/her chest, stomach and legs.

Front seat side airbag
The front seat side airbag has been improved with novel ideas for folding and packaging so that it can open more quickly to firmly hold the driver’s and passenger’s body. Its ability to hold the driver’s and passenger’s body has been optimized by effectively utilizing the stroke of energy absorption with the aim of reducing possible injuries to aged drivers and passengers who are less resistant to impacts.

Pedestrian Protection

Head protection measures
To reduce injuries to the head of a pedestrian in the event that his/her head hits the hood in a collision, a space has been secured inside the hood so that his/her head will be softly supported by the structure inside the hood and prevented from touching hard objects inside the engine compartment, such as the engine and structure parts.

Lower-back and leg protection measures
To reduce the severity of possible bone fractures in a pedestrian’s lower back and legs, as well as injuries to his/her knee ligaments, the CX-60 is designed so that, even if his/her lower back and thighs hit the front bumper, the face upper will softly support them with a reduced impact after that, while the lower stiffener will work similarly on his/her lower legs, thereby preventing the eversion of his/her knee joints and their resulting abnormal bend.
### External Evaluations for Mazda's Safety Technologies
Mazda has earned high evaluations for its safety technologies.

#### Third Party Safety Evaluations

**Rating by vehicle model**

<table>
<thead>
<tr>
<th>Country</th>
<th>Platform</th>
<th>DEMIO/MAZDA 2</th>
<th>MAZDA 3</th>
<th>ATENZA/MAZDA 6</th>
<th>CX-3</th>
<th>CX-30</th>
<th>CX-5</th>
<th>CX-8</th>
<th>CX-9</th>
<th>MX-30</th>
<th>ROADSTER/MX-5</th>
</tr>
</thead>
</table>

(As of the end of July 2022)

**Recent Evaluations**

<table>
<thead>
<tr>
<th>Country</th>
<th>Platform</th>
<th>Rating</th>
<th>Number of vehicle models receiving the highest possible rating/number of vehicle models evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>J-NCAP* 1 (Collision Safety Performance Tests)</td>
<td>S-Star</td>
<td>Not evaluated</td>
</tr>
<tr>
<td>US</td>
<td>US-NCAP* 2</td>
<td>S-Star</td>
<td>MAZDA 3, CX 30, CX 5, CX 9, MX 30</td>
</tr>
<tr>
<td>Europe</td>
<td>Euro-NCAP* 3</td>
<td>S-Star</td>
<td>Not evaluated</td>
</tr>
</tbody>
</table>

*1 Insurance Institute for Highway Safety
*2 Top Safety Pick+
*3 2022 model year Mazda3 Sedan, Mazda3 Hatchback, Mazda CX-30, Mazda CX-5, Mazda CX-9 currently on sale in the U.S.

Five Mazda U.S. specification models,*2 including the 2022 model year’s Mazda3 and CX-5, tested by the U.S. Insurance Institute for Highway Safety (IIHS), have been awarded the nonprofit organization’s highest safety rating. In addition to conducting crashworthiness tests (including a moderate overlap frontal crash test, a driver-side small overlap frontal crash test, a passenger-side small overlap frontal crash test, side crash tests, a head restraint test, and a roof strength test), the IIHS evaluates the performance of the crash damage reduction brake, which is a preventive safety technology, the crash avoidance performance of a frontal crash warning system, and headlight performance.

*1 Japan New Car Assessment Program: Vehicle collision safety performance evaluations conducted by the National Agency for Automotive Safety and Victims’ Aid. For collision safety performance, S-Star is the highest possible rating.

For Advanced Car Vehicle (ASV) Technology Assessment, ASV+++ is the highest possible rating (from 2018 to 2019).

*2 National Highway Traffic Safety Administration’s 5-Star Safety Ratings program. S-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. S-Star is the highest possible rating.

*5 Not yet introduced as of the end of July 2022.

*6 Not evaluated.

*7 As of the end of July 2022. Excluding OEM vehicles.

*8 Mazda 2 Hybrid.
Initiatives with People

It is said that most traffic accidents are caused directly or indirectly by human behavior.

Mazda endeavors to raise safety awareness among adults and children through various means of communication.

Raising Traffic Safety Awareness

In cooperation with local municipalities and organizations, Mazda and its Group companies in Japan and overseas conduct various activities to raise safety awareness.

In FY March 2022, Mazda participated in the Traffic Safety Challenge Festa held at Hiroshima City Transportation Museum and conducted safety-awareness raising activities, which it had continued in cooperation with the Hiroshima Branch of the Japan Automobile Association (JAF) since 2017 to increase the seatbelt usage rate. The importance for all car occupants to wear a seatbelt was explained through the simulation of a collision at a speed of 5 km/h, quizzes to raise children's safety awareness, and shock absorption experiments with toy cars. In addition, a safe driving seminar for aged drivers was held at a local community center.

Raising awareness of using a seatbelt and child seat

Safe Driving Demonstration

Starting from FY March 2015, Mazda has held the Mazda Driving Academy, an experience and training program to help customers in Japan learn the theories and techniques to control their cars easily, comfortably and safely. A variety of curriculums tailored to the needs and level of the customers are offered, from basic driver training of drive, turn, and stop, to the exciting experience of driving on a racing circuit, with the aim of improving their driving skills and raising the awareness of safe driving. In FY March 2022, the Mazda Driving Academy was held six times.

Driving position lecture

Experiencing sudden braking

Initiatives with Roads and Infrastructure

Initiatives toward Realizing a Safe Automotive Society with ITS*1

Traffic accidents and congestion are serious social problems in many countries and cities. To solve these problems, worldwide efforts have been taken to introduce advanced technologies for roads and automobiles. As an automobile manufacturer, Mazda has been proactively supporting the ITS project driven by the government and private sector, and working collaboratively with the national and local governments and related companies in order to realize a society where the road traffic is safe and accident-free.

Technology to Notify the Driver of Unseen Dangers

Mazda is promoting research and development of ITS as a means to monitor the objects in a distant position that cannot be detected by Mazda’s advanced technology i-Activsense or the areas in an intersection that cannot be seen from the driver.

ITS Projects Mazda Participates

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
<th>Organizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASV (Advanced Safety Vehicle)</td>
<td>Research and development to realize a system to assist safer driving utilizing cutting-edge technologies, including communication-based driving safety support systems. In 1991, the project’s first phase was launched, and currently discussions are under way as to the sixth phase.</td>
<td>Road Transport Bureau, Ministry of Land, Infrastructure, Transport and Tourism</td>
</tr>
<tr>
<td>ITS Connect*</td>
<td>The ITS Connect Promotion Consortium promotes practical application and widespread use of a driving support system combining automobile-related technology with new ITS communication technology. The consortium aims to achieve a safe anxiety-free transportation society, by studying the fundamental technology for the driving support system (ITS Connect), which utilizes ITS dedicated frequency band, and carrying out operation support.</td>
<td>ITS Connect Promotion Consortium</td>
</tr>
<tr>
<td>Hiroshima Sandbox</td>
<td>Effective use of communication-type ITS systems and open cloud data to enhance the safety and convenience of public transportation systems and make transportation smoother by realizing priority traffic signal control for public transportation systems, minimizing hazardous events at intersections and other places, and promoting ride sharing by increasing transfer convenience.</td>
<td>Hiroshima Prefecture</td>
</tr>
</tbody>
</table>

*1 Website of ITS Connect Promotion Consortium (https://www.itsconnect-pc.org/en/)

*1 ITS: Intelligent transport system uses telecommunications technology to bring together vehicles, people, and the traffic environment, with the aim of easing traffic congestion and reducing the number of accidents throughout Japan.