

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

Project	Description	Organizer
Smart Way	Research and preparation of next-generation road systems using ITS technology, linking people, vehicles, and roads by means of information, mainly for expressways and toll roads	Road Bureau, Ministry of Land, Infrastructure, Transport and Tourism
DSSS (Driving Safety Support Systems)	Research and development of driving safety support systems utilizing road-vehicle communication, in which signals are transmitted between vehicles and the road infrastructure, as well as systems to enable smooth traffic flow	National Police Agency, UTMS*1
ASV (Advanced Safety Vehicle)	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	Road Transport Bureau, Ministry of Land, Infrastructure, Transport and Tourism
ITS Connect*2	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.	ITS Connect Promotion Consortium

*1 UTMS Society of Japan

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

Advanced Safety Vehicle "Mazda Atenza ASV-5"

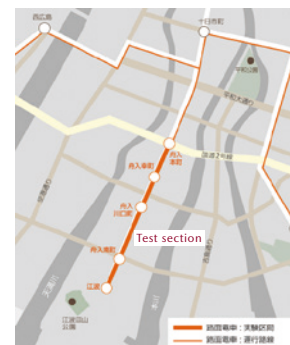
Mazda has participated in the ASV*2 research and development project since its first phase. In the fifth phase, the Company developed Mazda Atenza ASV-5 which is equipped with the communication technology-based driving safety support system. The vehicle is designed to eliminate blind-spots and supports hazard recognition in 360-degrees through a combination of vehicle-to-vehicle, street-to-vehicle and pedestrian-to-vehicle communication technologies and on-board autonomous sensors. The intuitive HMI displays hazards surrounding the driver in all directions including blind spots, and does not interfere with the operation of the vehicle. When the driver fails to recognize a hazard, and a risk of collision arises, the HMI warns the driver to brake.

Demonstration test for Streetcar-to-Vehicle Communication ASV

In October 2013, in Hiroshima City where about 150,000 people use streetcars each day, the world's first demonstration test*3 for the streetcar-to-vehicle communication + autonomous safety technology*4 was conducted jointly by the University of Tokyo, Hiroshima Electric Railway, and National Traffic Safety and Environment Laboratory, and Mazda Motor Corporation. The findings on the test are as follows:

- Effective in preventing collisions in situations such as when a vehicle turns right or enters the streetcar's path in order to pass a stopped vehicle.
- Effective in preventing accidents by coordinating with a smartphone application for the early detection of pedestrians who are in positions difficult for the driver to see.

V Demonstration Tests on Public Roads



Reference website:

<http://www.mazda.com/en/innovation/technology/safety/its/>

*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.

*2 ASV: Advanced Safety Vehicle

*3 As of September 2017, according to Mazda data.

*4 The test was conducted as one of the post-congress tour events for the ITS World Conference Tokyo 2013

Mazda's Safety Initiatives and Primary Safety Technologies

For more details, visit Mazda website:

SAFETY TECHNOLOGY : <http://www.mazda.com/en/innovation/technology/safety/>

Category	Accident reduction		Injury reduction
	Basic safety (Maximizing the range of conditions in which the driver can drive safely and comfortably)	Preventive safety (Mitigation of risk/damage from an accident)	Collision safety (Minimizing injuries in accidents)
Vehicles	<p>Offers the ideal driving position</p> <ul style="list-style-type: none"> ■ Ideal pedal layout ■ Organ-type accelerator pedal <p>Supports both safety and Driving Pleasure</p> <ul style="list-style-type: none"> ■ SKYACTIV-CHASSIS: A newly developed front strut and rear multilink suspension system; a lightweight cross member with high rigidity ■ Active Driving Display ■ A-pillar/door mirror for improved front field vision ■ Power Windows with Injury Prevention Function <p>Helps to avoid danger</p> <ul style="list-style-type: none"> ■ Brake Assist and EBS ■ 4-Wheel Antilock Braking System (4W-ABS) ■ Dynamic Stability Control (DSC) ■ Brake Override System (BOS) 	<p>Alerts drivers to potential danger</p> <ul style="list-style-type: none"> ■ Blind Spot Monitoring (BSM)/Rear Vehicle Monitoring (RVM) ■ Rear Cross Traffic Alert (RCTA) ■ Lane Departure Warning System (LDWS) ■ Lane-Keep Assist System (LAS) ■ Front Obstruction Warning (FOW) ■ Traffic Sign Recognition System (TSR) ■ 360 Degree View Monitor ■ Emergency Signal System (ESS) ■ Driver Attention Alert (DAA) <p>Minimizes damage in an accident</p> <p>[When moving forward]</p> <ul style="list-style-type: none"> ■ Smart Brake Support (SBS) ■ Advanced Smart City Brake Support (Advanced SCBS) ■ Smart City Brake Support F (SCBS-F) ■ AT Acceleration Control <p>[When reversing]</p> <ul style="list-style-type: none"> ■ Smart City Brake Support R (SCBS-R) ■ AT Acceleration Control <p>Supports both safety and Driving Pleasure</p> <ul style="list-style-type: none"> ■ Mazda Radar Cruise Control (with Stop & Go function) (MRCC) ■ Adaptive Front Lighting System (AFS) ■ High Beam Control (HBC) ■ Adaptive LED Headlight (ALH) 	<p>Helps to protect drivers/passengers in accidents</p> <ul style="list-style-type: none"> ■ SKYACTIV-BODY Straightened basic frame and continuous framework, multi-load path structure, cross-shaped front frame ultrahigh-tensile steel bumper frame ■ SRS Airbag System (Driver's seat, front passenger's seat, curtain and front-side airbags) ■ Soft Interior to Absorb Impacts ■ Front Seats Designed to Reduce Impacts to the Neck / Rear Seats that Resist against Luggage Flying Forward ■ Pre-Tensioners and Load-Limiter Seatbelts ■ Collapsible Brake Pedal ■ ISO-FIX-Compliant Child Seat <p>Anchoring point</p> <ul style="list-style-type: none"> ■ Impact-Absorbing Steering Column <p>Minimizes damage in an accident with pedestrians</p> <ul style="list-style-type: none"> ■ Impact-Absorbing Bumpers ■ Impact-Absorbing Hood ■ Active Hood
People	<p>Safety Education</p> <ul style="list-style-type: none"> ■ Safety-related exhibitions at the Mazda Museum ■ Traffic safety awareness quiz website for children ■ Presentation of safety technologies at various events 		
Roads and Infrastructure	<p>Initiatives for a Safe society</p> <ul style="list-style-type: none"> ■ Intelligent Transport Systems (ITS) ■ Smart Traffic Flow Control ■ ITS Spot services ■ Development of Advanced Safety Vehicles (ASVs) ■ Road-Vehicle Communication ITS (DSRC) ■ World's first demonstration tests*¹ for the streetcar-to-vehicle communication ASV in Hiroshima 		

*1 As of March 2018, according to Mazda data.