Making Safe Vehicles

Our Approach

Subaru Group believes that a car is more than just a means of transport, but rather a partner that enriches people's lives by understanding and meeting their expectations. Subaru's DNA comes from our origin as an aircraft maker, and has a focus on people. We think about what is important to people who use cars, and develop products with the necessary functions and performance.

“Focus on people. Think about what is important to people who use cars. And create new value with cars.” We believe that this is the SUBARU-ness.

Having roots in the aircraft industry, we have, for more than half a century, consistently engaged in automotive manufacturing with maximum emphasis on safety performance, attaching particular importance to protecting lives in order to ensure that each and every one of our customers experiences enjoyment and peace of mind. In our pursuit of vehicle safety performance from all perspectives, we are honing our unique safety technologies in the fields of Primary Safety, Active Safety, Preventive Safety, and Passive Safety, plus Connected Safety.

Subaru's overall safety philosophy, which focuses on delivering the world's highest standard of safety and peace of mind for all passengers. Our mid-term management vision STEP describes our efforts to enhance safety and peace of mind by setting a target of achieving zero fatal traffic accidents by 2030*. As such, we are engaged in the development of vehicles that will enable us to eliminate traffic accident deaths.

Aiming for Zero Fatal Traffic Accidents by 2030

Subaru has four safety areas. Primary Safety involves design that allows for a good field of vision and does not make the driver or passengers feel tired. Active Safety is controllability that allows a driver to avoid an obstacle that is in front of them, and to continue driving after avoiding it. Preventive Safety refers to pre-crash breaking, as represented by EyeSight. And Passive Safety involves damage mitigation to protect the driver and passengers in the event that an accident does occur. By polishing these four safety areas, we intend to achieve a low rate of fatal traffic accidents in the real world.

Subaru's intention does not lie in changing everything automatic, but in “Respect what humans are good at and leave what humans are not good at to automobiles for safe transportation.”

With this idea, Subaru has polished our driver assist technology. Going forward, the evolution of advanced driver assistance systems (ADAS) will make it possible to slow down and avoid collisions in high-speed zones and on large bends, which is expected to be of further assistance in preventing and mitigating accidents. At the same time, we still face an issue that around 30% of fatal accidents primarily caused by the no-fault accidents that is lower than the average for major selling brands in the United States for 10 consecutive years.* Domestically in Japan, Subaru cars also show a rate of fatal traffic accidents that is lower than the average for domestic auto manufacturers for 10 consecutive years.

Facts about fatal traffic accidents in the United States

* Reducing to zero the number of fatal accidents occurring while a driver or passenger in a Subaru vehicle and the number of fatalities among pedestrians, cyclists, and the like arising from collisions with a Subaru vehicle.

* These calculations were made independently based on data from the Fatality Analysis Reporting System (FARS) of the United States and the Institute for Traffic Accident Research and Data Analysis (ITARDA) of Japan.

EyeSight for 2030 (Japanese version only)

* Subaru cars sold in USA

Average of major brands sold in USA

Fatal accident numbers per one million vehicles in last five years.

Calculated by SUBARU based on FARS data

Fatal accident numbers per one million vehicles in last five years.

Average of 13 major brands sold in USA, including SUBARU (excluding trucks and large SUVs)
Initiatives

Primary Safety
Subaru's predecessor was an aircraft manufacturer. With aircraft, it is necessary to pursue "accident-free vehicle" design, as even a slight error in operation or judgement can cause a severe accident. Inheriting the philosophy of safety, Subaru focuses on the primary design such as surface and operation, thereby we pursue clear, useful and comfortable space where the driver can concentrate on driving easily.

Visibility Optimized for Every Condition
Early detection of danger can help avoid accidents. Subaru has concentrated efforts on minimizing blind spots and improving visibility even under difficult conditions such as driving in rain or at night.

Optimal Driving Position
Optimal driving position allows drivers to move naturally, reducing fatigue and helping to improve safety and comfort while driving. It also helps the driver to steer the car precisely for taking evasive action when the risk of an accident occurs. Subaru's cockpit is designed to be adjusted so that every driver can find their optimal driving position.

Intuitive Interface
Drivers can sometimes have a lapse in concentration when checking the navigation screen or adjusting the air conditioning. To prevent this from happening, Subaru has designed an interface layout that is easy to use. For example, the navigation screen is placed so that the driver does not need to shift their line of vision too far, while the air conditioning system and audio controls use switches that allow for intuitive operation so that drivers do not have to take their eyes off the road.

Active Safety
For Subaru, "driving" means more than simply delivering enjoyment. It is an important factor in increasing safety. To make it possible to avoid the situation safely if an accident occurs. To be able to drive safely in various weather conditions and road services, the same way as during normal conditions. Subaru has fine-tuned all the basic functions of a vehicle—driving, turning and stopping—to develop vehicles that offer exceptional stability and predictable control in the most challenging conditions, which makes cars safer and more trustworthy.

Driving Stability
On the foundation of the outstanding basic performance of the Symmetrical All-Wheel Drive paired with the horizontally-opposed engine, Subaru tempers the body and suspension of its vehicles along with employing vehicle control devices that increase drivability, creating stable driving that provides peace of mind to drivers and passengers.

Traceability
Imagine being able to drive into a slippery corner on a snowy or rainy day without unpredictable car movement, turn exactly as intended through the corner, and head out of the corner smoothly. Subaru includes a number of functions that make smooth cornering a reality.
■ Braking Performance
Braking performance is directly related to a car's safety, particularly its risk aversion capabilities. Subaru goes beyond polishing such performance, also placing great focus on peace of mind. Brakes that provide peace of mind work as predicted every time. Subaru repeatedly tests in all environments and on all road surfaces in our quest to deliver brakes that are easy to operate regardless of weather and that react quickly at the critical moment.

■ Collision Avoidance Support
Pre-crash brakes are aimed at collision avoidance by using automatic (damage reduction) braking. Reverse brake assist is designed to avoid collisions when driving in reverse. AT Forward Throttle Error Control and AT Reverse Throttle Error Control stop sudden jumps caused by operating the shift lever and the pedals. Through these and other technologies, Subaru supports the avoidance of collisions and protects the safety of drivers.

■ Reducing Operating Burden
Subaru reduces the burden of operation, supporting a safe, comfortable driving experience. An example is EyeSight, which recognizes cars, pedestrians and road lines, and automatically assists with the operation of the accelerator, brake, and steering. We ease the burden on drivers with a variety of features. Touring Assist greatly reduces operation burden in situations ranging from the stress of traffic congestion to fatigue from high-speed cruising, and Advanced Adapative Cruise Control maintains a safe preset distance from other vehicles. Active Lane Keep maintains vehicle position in the center area of the traffic lane and controls deviations from the traffic lane, while the Alarm and Warning Feature detects vehicle wobbling or deviation from the traffic lane and alerts the driver.

■ Improving Visibility
Smart Rear-View Mirror supports safely checking behind the car, and Front and Side-View Monitor reduces blind spots. These reduce the driver's blind spots, and assist with safe driving.

Preventive Safety
Eliminating accidents is the ultimate goal of any car manufacturer. Therefore, Subaru has developed the driving support system using stereo cameras and radar for more than 20 years. We have created advanced safety technologies, including EyeSight. Subaru continues to evolve to enhance the peace of mind and enjoyment of all people whose lives involve cars.

■ EyeSight Core Technology
EyeSight's main feature is that it allows for extra awareness and control through "stereo cameras." The cameras always monitor the forward direction. They can not only measure the same distance as a person's eyes, but can also distinguish between cars, pedestrians, and road lines. It boasts high cognition performance with its wide viewing angle and vision range as well as color recognition that perceives brake lights. Based on that information and the state of the vehicle's operation, the software which functions as the "brain" determines the necessary controls, and executes controls in a manner that fits the situation as the "hands and feet" in each vehicle unit. Leveraging the potential of the stereo cameras with help of various types of sensors, EyeSight achieves advanced driving support in every situation.

■ Support for Safe Driving
"Subaru Rear Vehicle Detection" uses sensors placed on the rear of the car frame to alert the driver to vehicles approaching from behind. Adaptative Driving Beam controls the range illuminated by high beam headlights, and High Beam Assist increases visibility and safety when driving at night by toggling high beams on and off automatically, depending on driving conditions. Through these features, Subaru supports safe driving.

■ New Ring-Shaped Reinforcement Frame
Subaru has a uniquely safe body design. In the cabin, the pillar and frame combine to form a "cage." The purpose of this is to protect from deformation regardless of the angle from which the vehicle is struck. A relatively crushable zone is provided to disperse and absorb the shock of a powerful impact. This gives Subaru vehicles high collision absorption performance against impacts from any direction.

Passive Safety
Since the time of "Subaru 360" when we launched mass production, Subaru has positioned safety as one basic function that cars should have. Also, we have been performing our original damage mitigation tests that include protecting pedestrians since the 1960s—a time before thinking regarding damage mitigation had yet to be fully instilled. Subaru's damage mitigation functions take into consideration not only the driver and passengers, but also pedestrians. They have received high evaluations both in Japan and around the world.
Respect for Human Rights       Quality       Making Safe Vehicles       Human Resources       Customers       CSR Procurement       Social Contribution

- **Front-end/Rear-end Collisions**
Even small components can become as deadly as weapons when receiving the powerful force of a collision. Based on that fact, Subaru equips its vehicles with a horizontally-opposed engine, which has the advantage of being able to effectively absorb the energy from a collision. During a front-end collision, not only can it easily slip under the floor, but the frame that absorbs the shock can extend symmetrically as well as straight. Each component of the cabin is made of shock absorbing materials in order to protect lives.

- **Front-end/Offset Collision/Rollover**
To protect the driver and passengers during a side collision, an extremely rigid side door beam is installed in the door. In addition to that, the new high-rigidity Ring-Shaped Reinforcement Frame protects the cabin space during a collision or rollover. Further, several kinds of airbags and energy absorption materials line the entire car, protecting every person inside the cabin.

- **Protecting Pedestrians**
Subaru strives to protect not only our drivers and passengers, but also pedestrians. For example, our horizontally-opposed engines have a wide energy absorption space between the front hood and engine unit. This reduces damage from being struck by the top of the hood, which is a highly probable head injury for pedestrians. Furthermore, our cars are designed to absorb the shock from components such as the hinge and hood stay. Subaru’s four safety areas, which take into consideration all forms of safety, can be found in all of our designs and initiatives, such as becoming the first Japanese automobile manufacturer to install Pedestrian Protection Airbags.

- **Safety Recognized around the World**
Subaru’s damage mitigation features have received high evaluations in safety assessments from countries all around the world.

- **Connected Safety**
We use connection technology and data based on Subaru's four safety areas of Primary Safety, Active Safety, Preventive Safety, and Passive Safety, and develop new technologies and services to further pursue safety. Subaru's mass market car models are equipped with the Driver Monitoring System, which attentively watches over the state of the driver. It detects when the driver looks away or shows signs of sleepiness, and sends an alert. Going forward, we will couple it with various controls.
Car Assessments

Subaru undergoes safety performance testing and assessment of public organizations in and out of Japan including JNCAP in Japan, IIHS\(^1\) in the U.S., EuroNCAP\(^2\) in Europe, and ANCAP\(^3\) in Australia, and has gained the highest rank of assessment in most of them.

In FYE 2020, the Forester received a performance test (no street light) for the collision damage reducing braking control device (pedestrian, nighttime) in the JNCAP preventive safety performance assessment, and again won the highest rating Advanced Safety Vehicle Triple Plus (ASV++++) rating.

*1. Insurance Institute for Highway Safety
*2. European New Car Assessment Programme: a program for publishing vehicle safety information conducted in Europe.
*3. The Australasian New Car Assessment Program: a safety assessment program that has been provided by an independent organization composed mainly of the transportation authorities of Australia and New Zealand since 1993.

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*1 U.S. models only.
*2 In the IIHS’s publication of vehicle safety information, TOP SAFETY PICK (TSP) award is given to vehicles that earned the rating of “Good” in all test results including the Offset Frontal Test, the Driver-side Small Overlap Front Test, the Passenger-side Small Overlap Front Test, the Side Crash Test, the Rear Impact Test and the Rollover Test the rating of “Acceptable” or higher in the Headlight Evaluation, as well as the rating of “Advanced” or higher in the Front Crash Prevention Test. In addition to these ratings, vehicles which have been installed the headlights which earned the rating of “Acceptable” or higher in the Headlight Evaluation as a standard equipment are awarded the TOP SAFETY PICK+ (TSP+).
Safety Is Our DNA

Having roots in the aircraft industry, the Subaru Group considers safety to be the most important feature underpinning automobiles. Since the launch of Subaru 360 more than half a century ago to this day, Subaru has engaged in automotive manufacturing with a philosophy of “All-Around Safety” and maximum emphasis on safety performance.

**SINCE 1917**
Ensuring Safety for Pilots

- Our DNA of Safety is Inherited from Aircraft Development

At the core of Subaru’s safety development expertise lie traits acquired from developing aircrafts. With aircraft, the implementation of ideas and countermeasures within the vehicle’s basic structure prevents the onset of danger. One indispensable safety feature of smaller aircrafts is the ability for the pilot to be able to secure an all-around unobstructed line of sight. This approach to safety has not diminished even after Subaru moved into automobile manufacturing.

**SINCE 1970**
Ensuring Safe Driving, Turning, and Braking

- Developing Proprietary Technologies for Enhanced Driving Safety

Fundamental automobile performance in terms of driving, turning, and braking differs significantly depending on the location of the center of gravity and the type of drive train. A low center of gravity and a drive train that delivers power to all of the wheels give constant stability when driving. In 1966, we launched the Subaru 1000—a FWD vehicle with a horizontally-opposed engine—and, in 1972, the 4WD Subaru Leone. Since that time, Subaru has continued to pursue safe and stable driving performance with our proprietary technologies.

**IN THE 1980s & 1990s**
Ensuring Safety for Drivers and Passengers

- Legacy Launched. Development of Driving Support Systems

Our flagship Legacy model set a world speed record in January 1989 for 100,000 km of continuous driving, demonstrating both reliable driving performance and mechanical endurance. Furthermore, Subaru commercialized Active Driving Assist (ADA), a driving support system using stereo cameras which was the predecessor of our current EyeSight technology.

**IN THE 2000s & 2010s**
Ensuring Safety for Everyone

- Commercialized EyeSight
Made the Latest Advanced Safety Features Standard Equipment on All Vehicles

Subaru commercialized our EyeSight technology, featuring stereo cameras constantly surveying the area forward of the vehicle and warnings and pre-crash braking functions for mitigating damage from accidents. In 2017, we began fitting vehicles with the new Touring Assist function, extending the minimum speed at which Lane Keep Assist can operate from 60 km/h to 0 km/h. Moving forward, Subaru is engaging in development for even more leading-edge technologies.
In recent years, reduction of CO₂ emissions has become a major environmental issue on a global basis, and this also encompasses aircraft. At the same time, electrification has garnered attention as a way to reduce environmental burdens. The Aerospace Company is active as a Steering Committee member of the Electrification Challenge for Aircraft (ECLAIR) Consortium, spearheaded by the Japan Aerospace Exploration Agency (JAXA), a national research and development agency. The Company has also formulated a future vision for the electrification of aircraft and created a technology roadmap with the goal of developing electrification technology that will drastically reduce environmental burdens, such as CO₂ emissions.

Also, with the “Roadmap towards Air Transportation Revolution” announced by the Ministry of Economy, Trade and Industry in December of 2018, Japan is increasing its momentum for a major advancement toward the development of flying cars. However, it is necessary to generate rules, including a great deal of legislation, to ensure traffic safety in the sky. Subaru is proposing a public and private sector conference to consider the creations of these rules.

Also, drones are seeing a remarkable rise in use recently. To improve safety, we are working on joint drone development with the New Energy and Industrial Technology Development Organization (NEDO), a national research and development agency, and four other organizations. Also, we succeeded in a flight demonstration for our technology that allows unmanned aircraft to automatically avoid danger, even in times of emergency. The test was conducted off the coast of Mikawawan from December 16 to 24, 2019, with cooperation from Aichi Prefecture, Toyokawa City, and Tahara City.

Going forward, Subaru will continue working on initiatives to ensure the safety of airspaces.