Vehicle Safety and Driver Assist Technologies

At Ford, we have a long history of developing and implementing new innovations that improve the safety performance of our vehicles. Back in 1955, for example, Ford became the first automaker to offer factory-installed safety belts. That legacy of innovation continues today.

Read more about OUR HIGHLIGHTS

OUR VISION FOR THE FUTURE

The radar- and camera-based technologies we offer today are a first step toward our vision of automated vehicles that still keep the driver in the loop to take back control of the vehicle, if needed. We have also been working on separate technologies that will enable vehicles to communicate with one another and with roadway infrastructure. Automated and connected vehicles will help to make driving safer, reduce traffic congestion and lower emissions.

Read more about ACCIDENT AVOIDANCE AND DRIVER ASSIST TECHNOLOGIES

OUR COMMITMENTS AND PERFORMANCE PROGRESS

Commitment: Design and manufacture vehicles that achieve high levels of performance in real-world safety and in public domain crash-testing programs and that offer innovative safety and driver assist technologies.

For the 2014 model year, nine Ford Motor Company vehicles earned the highest possible Overall Vehicle Score of five stars in the New Car Assessment Program (NCAP) of the U.S. National Highway Traffic Safety Administration. For the 2013 Insurance Institute for Highway Safety Awards, 13 Ford Motor Company vehicles earned Top Safety Picks.

See additional vehicle safety commitments at FORD'S GOALS, COMMITMENTS AND STATUS

UNIVERSITY PARTNERSHIPS

Ford collaborates with university partners on a broad array of research projects, including research into advanced safety technologies, and has more than 130 active projects globally. In 2013, we awarded 28 new research grants to 19 universities around the globe.

Read more about OCCUPANT PROTECTION TECHNOLOGIES

Case Study: PUBLIC DOMAIN RATINGS

Safety regulations and public domain rating programs differ around the world, and they are constantly evolving in response to various regional factors.

Case Study: ELECTRIFIED VEHICLE SAFETY

Because electrified vehicles (EVs) typically contain a battery with 300+ volts of power (compared to a 12-volt battery in a "regular" vehicle), first responders may need some special knowledge and skills to be able to safely address a vehicle crash involving an EV.

Case Study: DRIVER DISTRACTION

Studies indicate that approximately 10% of drivers are using their cell phones at any given time, which has heightened concerns about the potential for driver distraction.

Voice: PETE HARDIGAN

Director of Sustainability, Environment and Safety Engineering, Asia Pacific, Ford Motor Company

"Asia Pacific is a great example of our One Ford system at work. ... We're taking processes and products from around the globe and we're introducing them in Asia while meeting all the differing regulatory requirements."

POST-CRASH TECHNOLOGIES

SYNC®-equipped vehicles come with a nonsubscription call-for-help system called SYNC 911 Assist (in the U.S.) or Emergency Assistance (in Europe, China, India and Australia).

Read more about POST-CRASH RESPONSE TECHNOLOGIES

DRIVER EDUCATION

Ford Driving Skills for Life (Ford DSFL), our flagship, free driver-education program, demonstrates our commitment to help new drivers to improve their motoring skills. Ford DSFL has been active in the United States and Asia, and in late 2013 we launched it for the first time in Europe.

Read more about DRIVER EDUCATION

2013 HIGHLIGHTS

16 countries

in which Ford Driving Skills for Life is training drivers.

5 stars

for adult protection in the most recent Latin NCAP, for the Ford EcoSport and Ford Focus.

Highlights

Ford's recent safety and driver assist highlights include the following:

- For the 2014 model year, nine Ford Motor Company vehicles earned the highest possible Overall Vehicle Score of five stars in the New Car Assessment Program (NCAP) of the U.S. National Highway Traffic Safety Administration (NHSTA). These five-star vehicles include the Ford Focus, Focus Electric, Explorer, Taurus, Fusion, Fusion Energi and Transit Connect and the Lincoln MKS and MKZ.
- For the 2013 Insurance Institute for Highway Safety (IIHS) awards, 13 Ford Motor Company vehicles earned Top Safety Picks from the IIHS: the Ford Fiesta (sedan and hatchback), Focus, Fusion, Taurus, Edge, Explorer, Escape, Flex and F-150 (crew cab) and the Lincoln MKZ, MKS, MKT and MKX.
- Three of the 13 vehicles that were awarded IIHS Top Safety Picks also earned Top Safety Pick+ designations: the Ford Fusion and Focus, and the Lincoln MKZ.
- The Ford Fusion has now been an IIHS Top Safety Pick for six years in a row.
- In the 2013 Euro NCAP assessments, the Ford Tourneo Connect earned a five-star safety rating. In addition, the vehicle received the Euro NCAP's Best in Class recognition for the highest safety performance scores in the vehicle segment.
- The Ford Transit Custom and Tourneo Custom were the first van and "kombi" (i.e., multi-purpose vehicle), respectively, to achieve five-star ratings in the Euro NCAP heavy vehicle assessment. The Transit also received Euro NCAP's Best in Class recognition for the highest safety performance score in its segment.
- Ford has an industry-leading total of seven Euro NCAP Advanced rewards, for our Lane-Keeping Aid, Active City Stop, Forward Alert, Lane-Keeping Alert, MyKey®, Emergency Assistance and Driver Alert technologies.
- In the most recent Latin NCAP, the new Ford EcoSport and Focus both received five stars for adult protection.
- MyKey, Ford's innovative technology designed to help parents encourage their teenagers to drive more safely, is now in more than 6 million Ford and Lincoln vehicles on the road in the U.S. and is available on nearly all Ford Motor Company retail vehicles in North America.
- Our available rear-seat inflatable safety belts, launched on the 2011 Ford Explorer, are an automotive industry exclusive and have won numerous awards. For the 2014 model year, these safety belts are available in North America on several Ford and Lincoln vehicles.
- The availability of Lane-Keeping System, a driver assist feature, has been expanded in North America to include more vehicles, and it will be expanded further for the 2015 model year.
- Curve Control, a driver assist technology that helps slow the vehicle when it senses the driver is taking a curve too quickly, is now available on select vehicles in North America and Europe.
- Finally, in 2014 we performed our 20,000th vehicle crash test. Our first was in 1954, well before these tests were required by law.

Related links

This Report

- Accident Avoidance and Driver Assist Technologies
- Encouraging Safer Driving

Vehicle Websites

- Ford Fiesta
- Ford Focus
- Ford Focus Electric
- Ford Fusion
- Ford Fusion Energi
- Ford Taurus
- Ford Escape
- Ford Edge
- Ford Explorer
- Ford Flex
- Ford F-150
- Ford Transit Custom
- Ford Transit Connect
- Ford Tourneo Custom
- Ford Tourneo Connnect
- Lincoln MKZ
- Lincoln MKX
- Lincoln MKS
- Lincoln MKT

External Websites

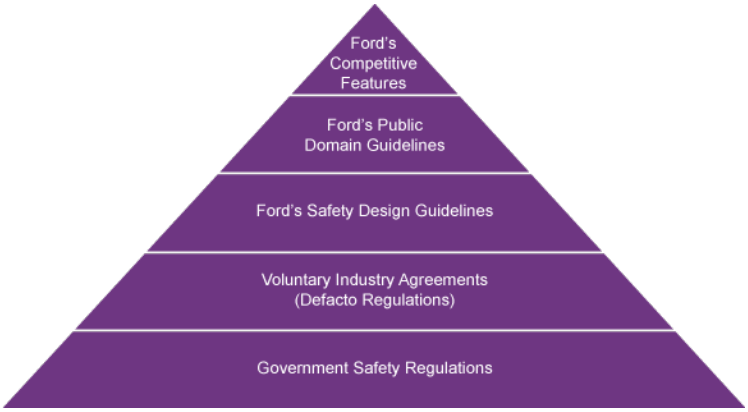
- European New Car Assessment Program
- Insurance Institute for Highway Safety
- Latin New Car Assessment Program
- U.S. National Highway Traffic Safety Administration's New Car Assessment Program

How We Manage Vehicle Safety

At Ford, we design and manufacture vehicles that achieve high levels of vehicle safety for a wide range of people over a broad spectrum of real-world conditions. Vehicle safety is overseen by our Vice President of Sustainability, Environment and Safety Engineering.

Real-world safety data, driver behavior, research, regulatory requirements and voluntary agreements provide much of the input into our safety processes, including our safety design guidelines (SDGs) and public domain guidelines (PDGs). (See graphic below.) The SDGs are Ford's stringent internal engineering design guidelines that exceed regulatory requirements and define additional requirements that are not regulated. The PDGs are Ford targets that focus specifically on helping to ensure that our vehicles earn high ratings in relevant public domain assessments (i.e., vehicle safety assessments performed by government or nonprofit entities).

Our PDGs are continually reviewed for possible revisions to address ongoing changes in major public domain vehicle testing programs around the world. See the Public Domain Ratings case study for information on this topic.



Internally, Ford utilizes engineering analyses, extensive computer modeling, and crash and sled testing to evaluate the performance of vehicles and individual components. These rigorous evaluations help to confirm that our vehicles meet or exceed regulatory requirements and our own even-more-stringent internal guidelines. Our state-of-the-art crash-test facilities include the Safety Innovation Laboratory in Dearborn, Michigan, and the extensive crash-test facilities in Merkenich, Germany, and Dunton, England. We also operate a high-tech, full-motion driving simulator in Dearborn called VIRTTEX, for VIRtual Test Track EXperiment.

Haddon Matrix

We use the Haddon Matrix to take a holistic view of the factors that may affect vehicle safety. (The matrix was developed by William Haddon, a former administrator of the U.S. National Highway Traffic Safety Administration and also former president of the Insurance Institute for Highway Safety.) The Haddon Matrix illustrates how traffic safety can be the product of complex interactions among the driver, the vehicle and the driving environment.

The Haddon Matrix is used to look at crashes in terms of causal and contributing factors, including human behavior, vehicle safety and the driving environment. Each factor is then considered in the pre-crash, crash and post-crash phases. In the pre-crash phase, the focus is to help avoid the crash. In the crash and post-crash phases, the primary objective is to help reduce the risk of injury to occupants during and after a collision. In the post-crash phase, for example, the goal is to minimize the amount of time that elapses between the crash and when help arrives.

Related links

This Report

→ Case Study: Public Domain Ratings

	Human Behavior	Vehicle Safety	Environment
Pre-Crash Accident avoidance	▪ Research ▪ Education ▪ Advocacy	▪ Crash avoidance technologies ▪ Security	▪ Road design for accident avoidance ▪ Traffic control
Crash Occupant protection	▪ Technology and proper use	▪ Restraints ▪ Structures that absorb and reduce crash energy and intrusion	▪ Road design for injury mitigation ▪ Research
Post-Crash Injury mitigation	▪ Telematics	▪ Post-crash notification	▪ Emergency medical services
Examples of Ford Actions	▪ SYNC® technology ▪ MyFord Touch® driver connect technology ▪ MyKey® ▪ Ford Driving Skills for Life	▪ Accident avoidance features ▪ Inflatable safety belts ▪ Roll Stability Control®	▪ Accident research ▪ Development of “vehicle-to-infrastructure” communication systems

Encouraging Safer Driving

Driver behavior is a key contributing factor in many vehicle crashes.[1] We at Ford have developed and support an array of programs and technologies that help to encourage safer behavior on the roadways, for both experienced and novice drivers.

Ford Driving Skills for Life (Ford DSFL), our flagship, free, driver-education program, also demonstrates our commitment to help new drivers to improve their motoring skills. Ford DSFL was established in 2003 by Ford Motor Company Fund and Community Services, in partnership with the Governors Highway Safety Association (GHSA) and a panel of experts, to teach newly licensed teen drivers skills for safe driving – beyond what they learn in standard driver education programs. The Ford DSFL website includes an array of free resources for novice drivers, including an interactive Web-based training called The Academy.

In the U.S., Ford DSFL has been focusing on teen drivers through five signature programs:

- **The Ford DSFL National Tour:** In 2013 the Ford DSFL National Tour reached out to more teens, parents and educators than ever before. This included nearly 30 days of hands-on training throughout the United States. During these visits, teens are invited to hands-on driving clinics utilizing specially equipped vehicles. The clinics offer multifaceted activities that build skills in four key areas: driver distraction, speed/space management, vehicle handling and hazard recognition. In 2014, the Ford DFSL tour will travel to more than 20 cities in the U.S. and Europe.
- **Taking the Lead:** Our Taking the Lead program – co-sponsored by Ford Motor Company Fund and Community Services, Westfield Insurance, the GHSA and Allegheny County Pretrial Services – brings a one-hour presentation on safe driving to high school assemblies. The assemblies include a question-and-answer segment with a panel of experts.
- **Operation Teen Safe Driving:** Operation Teen Safe Driving is sponsored in partnership with the Illinois Department of Transportation, the Secretary of State and the state police. The program gets Illinois high school students directly involved in safe driving behaviors by challenging them to develop and implement teen safe driving community-awareness campaigns using Ford DSFL resources. Since the program's launch in 2007, teen vehicle crash deaths in Illinois have decreased 55 percent.
- **Strive 4 a Safer Drive (S4SD):** Launched in 2011, Strive 4 a Safer Drive provides funding to Michigan schools to assist in creating peer-to-peer traffic safety campaigns. The campaigns seek to educate classmates and the community about teen safe driving through various activities. Modeled after Operation Teen Safe Driving, S4SD is sponsored by Ford Motor Company Fund and Community Services, the Michigan Office of Highway Safety Planning and AAA Michigan.
- **Be in the Zone:** The Be in the Zone program focuses on improving teen driver safety among rural youth in Tennessee through peer-generated anti-texting campaigns. Be in the Zone was launched in partnership with the Monroe Carell Jr. Children's Hospital at Vanderbilt University in 2011.

In our Asia Pacific markets, Ford DSFL is aimed at novice drivers of all ages. In this region the program places equal emphasis on safe driving and eco-driving, as customers are interested in both. Approximately 14,000 drivers in this region were trained in 2013. In 2014, we will continue the program in mainland China, India, Taiwan, Thailand, Indonesia, Vietnam and the Philippines, as well as expand to Malaysia and Myanmar, to train another 15,000 people. More than 77,000 people have been trained in the Asia Pacific region since the program began. (See the Pete Hardigan voice for more about Ford DSFL in Asia Pacific.)

In late 2013, we launched Ford DSFL for the first time in Europe. Ford will invest €1.5

Related links

This Report

→ Voice: Pete Hardigan

Ford Websites

→ Ford Driving Skills for Life

External Websites

→ Operation Teen Safe Driving

→ Strive 4 a Safer Drive

million in the first year of this program alone to provide free, hands-on training to 5,000 young drivers in France, Germany, Italy, Spain and the U.K., and to thousands more online through The Academy. In 2014, Ford DSFL will be launched in several additional European countries.

In total, Ford DSFL is training drivers to be safer in 16 countries around the globe and plans to grow to 23 before 2015.

On the technology side, the Ford MyKey® system is an innovative technology designed to help parents encourage their teenagers to drive more safely. MyKey is now in more than 6 million Ford and Lincoln vehicles on the road in the U.S. MyKey allows owners to program a key that can limit the vehicle's top speed to one of several preset values and also can invoke SYNC's Do Not Disturb feature, which sends incoming phone calls and text messages to the paired phone's mailbox. MyKey encourages safety belt usage by enabling Ford's Belt-Minder® to chime every minute indefinitely until both of the front passengers are buckled in, rather than ceasing after five minutes, and also through a "no belt/no tunes" feature that mutes the audio system until the belt is buckled. In addition, MyKey provides a low-fuel warning earlier than the standard vehicle setting; sounds speed-alert chimes; and will not allow manual override of other safety systems. MyKey is available on nearly all Ford Motor Company retail vehicles in North America, and its availability is expanding to other regions.

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1. U.S. Department of Transportation, National Highway Traffic Safety Administration, National Motor Vehicle Crash Causation Survey: Report to Congress (Washington, DC: U.S. DOT, July 2008).

Accident Avoidance and Driver Assist Technologies

On this page

Related links

This Report

- Our Blueprint for Mobility

External Websites

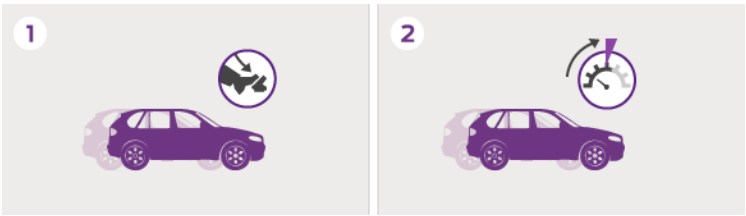
- DRIVE C2X
- interactIVe
- National Highway Traffic Safety Administration
- Vehicle Infrastructure Integration Consortium

A variety of Ford technologies, in addition to each vehicle's handling and braking capabilities, can assist drivers by helping to control the vehicle or alerting the driver to potential collisions. Also, these technologies can support routine driving tasks by improving comfort and reducing demands on the driver. Driver assistance technologies will continue to advance to include semi-automated capabilities, providing drivers more assistance in certain situations, such as when changing lanes, in traffic jams or on freeway trips. The driver will always remain in the loop to take control, if required.

Ford Technologies

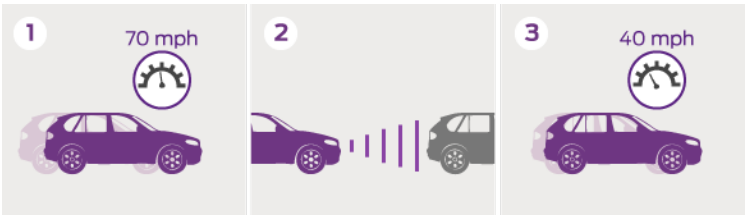
The following accident avoidance and driver assist technologies are offered on Ford vehicles today.

Adjustable Speed Limiter Device



Adjustable Speed Limiter Device (ASLD) allows the driver to set a speed limit that cannot be exceeded by standard gas pedal operation. The driver can override the limit, however, by pressing the accelerator pedal beyond normal usage limits (>90 percent pedal travel). ASLD is offered on select Ford Motor Company vehicles in Europe and China.

Adaptive Cruise Control



Adaptive Cruise Control (ACC) helps drivers maintain a preset distance from the vehicle they are following, using a radar module mounted at the front of the vehicle that measures the gap and closing speed to the vehicle ahead. The system automatically adjusts the speed of the car to help maintain a preset distance from the vehicle in front. If the radar sensor becomes blocked by snow, ice or mud, the driver receives a notice of reduced or suspended functionality. ACC is available on select Ford and Lincoln vehicles in North America. In Europe and China, ACC is available with another technology called Distance Alert. Distance Alert helps the driver to keep a proper distance from the vehicle ahead by providing a visual warning if the driver-selected following distance is exceeded.

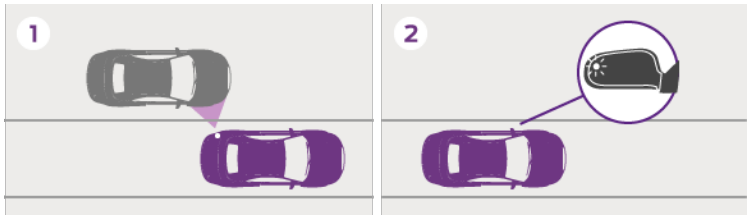
Forward Collision Warning with Brake Support

Ford's **Forward Collision Warning with Brake Support** technology uses the same radar module as Adaptive Cruise Control to detect range and speed. Forward Collision Warning with Brake Support activates a visual and audible warning when the system detects a high risk of collision with the vehicle in front. In addition, the brake system is pretensioned and the "servo boost" assistance system is modulated to provide faster brake performance (e.g., as soon as the driver lifts the gas pedal), if required by the driver. As with ACC, if the sensor becomes blocked, the driver receives a notice of reduced or suspended functionality. This technology is available on certain Ford and Lincoln vehicles in North America and Europe.

Lane-Keeping System

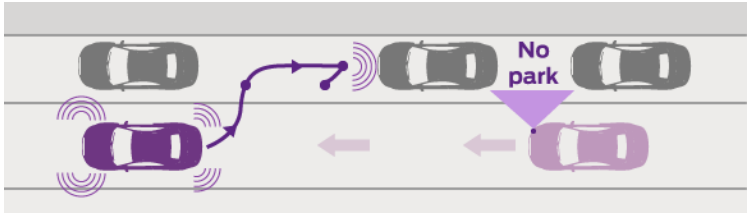
Our **Lane-Keeping System** consists of three elements to help a driver maintain proper lane position: Driver Alert, Lane-Keeping Alert and Lane-Keeping Aid. Using a small, forward-facing camera behind the inside rearview mirror, the system "looks" down the road, monitoring lane lines. Driver Alert computes a "vigilance level" and displays it in the instrument cluster upon request. If the vigilance level falls below a certain level (e.g., if the driver gets tired), visual and audible warnings are given. Lane-Keeping Alert is designed to warn the driver, via a three-pulse vibration in the steering wheel, when the front-view camera detects that an unintentional lane departure is happening. Lane-Keeping Aid goes a step further, applying a steering torque in the direction the driver needs to steer to keep the vehicle in the current lane. Lane-Keeping System is available on select Ford and Lincoln vehicles in North America and Europe. On some European Ford vehicles, Lane-Keeping Alert and/or Driver Alert are available separately.

Blind Spot Information System with Cross-Traffic Alert



Blind Spot Information System (BLIS) with Cross-Traffic Alert (CTA) uses rear corner-mounted, side- and rear-looking radar that detect other vehicles around the car and illuminates an indicator lamp in the side-view mirrors when driving forward. When backing out of a parking space, the same sensors can detect vehicles approaching from the sides, illuminate the indicator lamp in the side view mirror, provide a text alert in the cluster and sound a warning chime. BLIS with CTA is available on certain Ford and Lincoln vehicles in North America; BLIS without CTA is available in Europe and Asia Pacific.

Active Park Assist



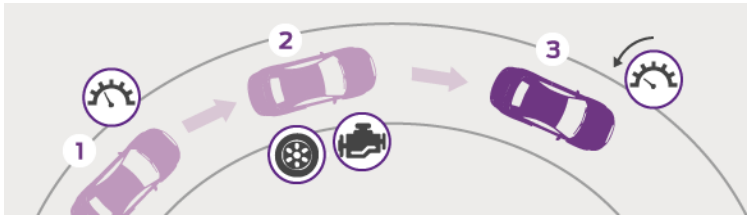
Active Park Assist uses ultrasonic sensors, while the driver is slowly driving near parking spots, to measure the distance between cars. When a suitable parking space

is found, Active Park Assist can steer the car into the parking space while the driver controls the shifting, accelerator and brake. Active Park Assist is available on certain Ford and Lincoln vehicles in North America and Europe.

Rear View Camera

Our **Rear View Camera** transmits an image of what is behind the vehicle when it is shifted in reverse. Rear View Camera is available on every Ford and Lincoln vehicle in North America and several Ford vehicles in Europe.

Curve Control

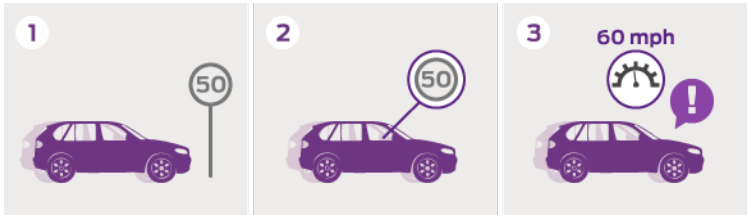


Curve Control is designed to sense when a driver is taking a curve too quickly. In those situations, it rapidly reduces engine torque and can apply four-wheel braking, slowing the vehicle by up to 10 mph in about a second. The technology is designed to be effective on wet or dry pavement, and is expected to be helpful when drivers are entering or exiting freeway ramps with too much speed. A majority of Ford's North American products will offer Curve Control by 2015. It is currently available on one vehicle in Europe.

Active City Stop

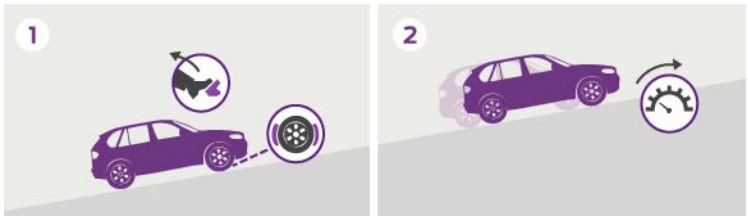
Using a forward-looking radar sensor, **Active City Stop** is designed to detect objects in front of the car and constantly calculate the braking force required to avoid a collision. If the estimated braking force exceeds a given level without the driver responding, the danger of a collision is considered imminent and the system automatically reduces throttle input and applies the car's brakes. The system is designed for speeds of 30 to 50km/h (19 to 31 mph). Active City Stop is available on select Ford vehicles in Europe.

Traffic Sign Recognition



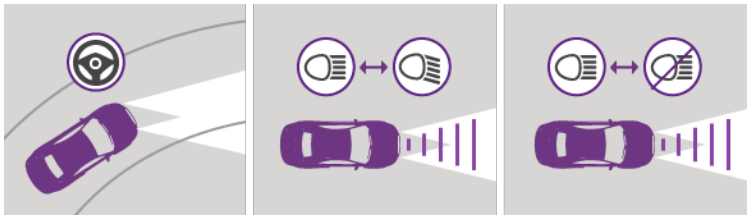
With **Traffic Sign Recognition**, a front camera recognizes speed signs that use the standards of the Vienna Convention on Road Signs and Signals. The identified speed is then indicated in the instrument cluster to inform the driver of the speed limit. If activated, the cluster will also warn the driver if the speed limit is exceeded. Traffic Sign Recognition is available in Europe.

Hill Start Assist



Hill Start Assist helps the driver when starting the vehicle on an uphill gradient by holding the brakes while the driver moves his foot from the brake pedal to accelerator pedal. This system is available standard on most new Ford Motor Company vehicles in North America and Europe.

Advanced Front Lighting



Several types of advanced front lighting are now available on Ford Motor Company vehicles, including the following:

Steerable headlights are designed to use inputs from the steering wheel to turn the headlamps, so the driver can get a better view while negotiating a curve. Steerable headlights are offered on most new Lincoln products.

Automatic high beam control allows the driver to use the high beam to improve visibility. The system uses a forward-facing camera to detect vehicles ahead and automatically deactivates the high beam. Automatic high beam control is offered on most new Ford vehicles in North America and Europe.

Glare-free headlamps are designed to provide improved visibility during nighttime driving by using LED headlamps and input from a forward-facing camera to detect vehicles ahead. The system selectively switches off the LEDs to prevent glare for oncoming drivers. Glare-free headlamps are available in Europe.

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Vision for the Future

The radar- and camera-based technologies described above are a first step toward Ford's vision of automated vehicles that still keep the driver in the loop to take back control of the vehicle, if needed. We are continuing to develop technologies that allow for more semiautomated capabilities.

At the same time, we have been working on separate technologies that will enable "connected" vehicles – that is, vehicles that can communicate with one another and with roadway infrastructure using advanced Wi-Fi signals or dedicated short-range communications on secured channels. By communicating with each other and the world around them, these vehicles will be a key element of the integrated transportation ecosystem we envision in our Blueprint for Mobility.

In our long-term vision of a future with vehicles that are both automated and connected, driving will be safer, traffic less congested and greenhouse gas emissions lower. Such vehicles will be able to warn drivers if their vehicle is on a path to collide with another vehicle at an intersection, when a vehicle ahead stops or slows suddenly, or when a traffic pattern changes on a busy highway. By reducing collisions, connected vehicles will ease traffic delays, which will save drivers both time and fuel. Gridlock will also be avoided through a network of connected vehicles and infrastructure that processes traffic information and suggests less-congested routes to drivers.

Admittedly, this vision will likely not be realized for many years. Many technological details remain to be worked out, and drivers will need to become comfortable with the idea of giving up some measure of driving control to their vehicle, which will not happen quickly. In the United States in early 2014, however, the connected vehicle concept got a significant boost when the National Highway Traffic Safety Administration (NHTSA) announced it intends to complete ongoing research and begin working on a regulatory proposal for light vehicles that will require "vehicle-to-vehicle" communication devices in new vehicles.

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Collaborative Research

In order to progress from current technologies to our long-term vision of connected and automated vehicles, we are conducting collaborative research with a variety of public, private and academic entities.

In December 2013, for example, we unveiled a Ford Fusion Hybrid automated research vehicle that will enable us to further test current and future sensing systems and driver assist technologies. Our goal is to advance the development of new technologies that can then be applied to the company's next generation of vehicles. The research is being conducted jointly with the University of Michigan and State Farm®. In addition, in January 2014, we announced new research projects with the Massachusetts Institute of Technology and Stanford University to research and develop solutions to some of the technical challenges surrounding automated driving.

For a number of years, the U.S. Department of Transportation (USDOT) has been coordinating two automaker research coalitions relating to connected vehicles. The first is the Crash Avoidance Metrics Partnership (CAMP), a group of eight automakers that focuses on the technical aspects of connected vehicles; the second is the Vehicle Infrastructure Integration Consortium (VIIC), a group of nine automakers that focuses on the policy aspects of connected vehicles.

CAMP has been working on the technical standards necessary for all motorized vehicles on the connected vehicle network to be interoperable. This technical partnership included the world's first government-sponsored driving clinics in 2011 and expanded to include a year-long field trial beginning in late 2012. The field trial included data collection on approximately 3,000 vehicles that were communicating with each other. USDOT is currently analyzing data from this field trial and is expected to publish a report in 2014. The field trial was instrumental in supporting NHTSA's decision to support and eventually require vehicle-to-vehicle communications, as discussed above.

The VIIC is working on the significant practical and policy challenges, such as security, privacy and the allocation of risk and liability, that will need to be addressed before the vision of a connected vehicle network can become a reality.

In Europe, we are contributing to the European harmonization and standardization of wireless communication systems and applications within the framework of the DRIVE C2X project, which is co-funded by the European Commission. DRIVE C2X is the acronym for "DRIVing implementation and Evaluation of C2X communication technology in Europe" (C2X refers to "car-to-car and car-to-infrastructure" communication). This project kicked off in January 2011 and is planned to run until mid-2014. It brings together more than 40 stakeholders, such as vehicle manufacturers, suppliers, universities and public authorities from all over Europe. Within the framework of DRIVE C2X, field operational tests in a real-world environment have been conducted over the course of six to nine months in seven test sites across Europe.

One of these test sites is located in Frankfurt/Main, Germany, and is closely linked to a national research initiative called Safe Intelligent Mobility – Test Field Germany, or sim^{TD} for short. Ford contributed to this joint project, which brought together relevant stakeholders of the German automotive industry and concluded successfully in June 2013. sim^{TD} was one of the world's first large-scale field operational tests of cooperative systems. Over six months, 120 vehicles from six automakers were driven more than 1.6 million kilometers. Ford contributed with 20 Ford S MAX vehicles equipped with innovative vehicle-to-infrastructure technology. Within sim^{TD}, 500 drivers tested and validated more than 20 functions targeting traffic safety, efficiency and comfort. Ford led the development of the Emergency Electronic Brake Light warning functionality. The project was supported in part by the German government.

Also in Europe, we have been one of 29 partners in the Accident Avoidance by Active Intervention of Intelligent Vehicles (interactIVe) research project, led by the Ford European Research Center in Aachen, Germany. This consortium sought to support the development and implementation of accident avoidance systems, and consisted of seven automotive manufacturers, six suppliers, 14 research institutes and three other stakeholders. The European Commission covered more than half of the €30 million budget. During the 42-month duration of interactIVe, the partners tested the performance of prototype safety systems through active intervention, including automated braking and steering in critical situations, with the aim of avoiding collisions or at least mitigating impact severity in accidents. The final event of InteractIVe in November 2013 took place in Aachen and at Ford's Lommel Proving Ground, with live vehicle demonstrations.

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Occupant Protection Technologies

Many factors influence a vehicle's crash performance, including the design of the vehicle's structure (i.e., its ability to absorb impact energy) and the use of passive safety equipment such as air bags to supplement safety belts. Ford's commitment to advancing the state-of-the-art in vehicle safety includes research and development of technologies that further enhance occupant protection in a wide variety of crash circumstances.

Ford Technologies

Ford is using more advanced materials than ever, including ultra-high-strength steels, plastics and composites, and aluminum. Increased use of these materials helps us design vehicle structures with enhanced crash energy management while reducing overall vehicle weight – even as we add more features, equipment and safety devices. For example, the all-new Ford F-150 uses aluminum alloys extensively in its body and truck bed. In Europe, the Ford B MAX extensively uses high-strength steels in its body shell and doors.

Safety belts remain the most important vehicle safety technology available. Beginning with the 2011 Ford Explorer, Ford brought to market the world's first automotive rear inflatable safety belts, which resulted in several prestigious awards for technological achievement. The rear inflatable safety belts combine the attributes of traditional safety belt and air bag technologies to help further reduce the risk of head, neck and chest injuries for rear-seat passengers. In everyday use, the inflatable belts operate like conventional safety belts and are safe and compatible with infant and child safety car and booster seats. Rear-seat inflatable safety belts are available on selected vehicles in North America.

Vision for the Future

Ford has a long history of research into passive safety, or helping protect occupants in the event of crash. We continue to pursue research and advanced engineering in passive safety, and we participate in and sponsor passive safety research at colleges and universities, in addition to internal projects. Also, we publish our major research findings on this topic in peer-reviewed and other scientific journals.

Collaborative Research

Ford continues to collaborate with other automotive companies on precompetitive safety projects to enhance the safety of the driving experience and develop future technologies.

U.S. Council for Automotive Research

For example, we collaborate with General Motors and Chrysler through the various safety-related working groups, committees and councils of the U.S. Council for Automotive Research (USCAR). These include the Safety Technical Leadership Council (Safety TLC), the Occupant Safety Research Partnership (OSRP) and the Crash Safety Working Group (CSWG).

The OSRP performs research, development, testing and evaluation on anthropomorphic test devices (ATDs), commonly known as crash test dummies. Projects planned for 2014 include evaluation of new child ATDs, continued work on a new adult, side-impact ATD, evaluation of a new pedestrian leg form, and evaluation of a new average male ATD, called THOR, developed by the U.S. National Highway Traffic Safety Administration (NHTSA). The OSRP evaluations provide a measure of repeatability, reproducibility, biofidelity, usability and durability. The evaluations are meant to ensure that new ATDs are truly scientific instruments capable of simulating the responses of human occupants in crashes.

The CSWG conducts and directs precompetitive research on crash-related safety

Related links

This Report

→ Case Study: The New F-150

Vehicle Websites

→ Ford B MAX

External Websites

→ U.S. Council for Automotive Research

→ Center for Child Injury Prevention Studies

issues, with a current focus on issues associated with aspects of advanced, alternate-fueled, energy-efficient vehicles. In 2013, the working group completed the development of crash-test procedures for live lithium-ion battery testing collaboration with Sandia National Laboratories. The working group also wrote a technical paper entitled “Idealized Vehicle Crash Test Pulses for Advanced Batteries” that was subsequently accepted for publication by SAE International. The CSWG has begun work on a new exploratory project aimed at developing new modeling capabilities to address current voids in crash simulation of advanced lightweight materials. This project should be an enabler for USCAR members in their development of advanced lightweight vehicles.

National Science Foundation’s Center for Child Injury Prevention Studies

Ford continues to support research at the National Science Foundation (NSF) Center for Child Injury Prevention Studies (CChIPS) at the Children’s Hospital of Philadelphia and University of Pennsylvania. CChIPS is an NSF Industry/University Cooperative Research Center. Participants include seven automotive companies, NHTSA, Consumer Reports, automotive suppliers, child-seat manufacturers, insurance companies and a crash-test dummy manufacturer.

In addition to helping fund the work, Ford scientists and engineers help to select the research projects pursued by CChIPS researchers each year and even serve as mentors for projects that need automakers’ vehicle safety expertise. Current projects include, among others, a study to explore ways to provide real-time, in-vehicle, positive reinforcement of appropriate teen driving behaviors; a study to develop a better understanding of pediatric brain injury in automobile crashes; and a study to compare child crash dummies to pediatric volunteer subjects in low-speed crash simulations.

University Partnerships

Ford collaborates with university partners on a broad array of research projects, including research into advanced safety technologies, and has more than 130 active projects globally. In recent years, we have fine-tuned the objectives of our grant-providing University Research Program (URP), moving away from pure exploratory and long-term research and toward highly collaborative projects focused on innovations with more near- and mid-term implementation potential. We have also substantially expanded activity with our strategic alliance partner schools: the University of Michigan, the Massachusetts Institute of Technology, Stanford University and RWTH Aachen University.

In 2013, Ford awarded 28 new URP grants to 19 universities around the globe. Recipient schools in the United States included Wayne State University, Michigan State University, Ohio State University, University of Michigan, University of Minnesota, Washington State University, Pennsylvania State University, Central Michigan University and Northeastern University. In Europe, new URP grants were awarded to RWTH Aachen University and Koc University. In the Asia Pacific region, grants were awarded to Shanghai Jiao Tong University, Tsinghua University, Beijing Institute of Technology, Zhejiang University, Chongqing University in China; University of Melbourne and Deakin University in Australia; and India Institute of Technology Madras in India. Our recently unveiled Automated Fusion Hybrid research vehicles have been collaboratively developed in partnership with the University of Michigan with supporting projects at MIT and Stanford. In 2014, we expect to substantially increase our collaborative university activities globally with significant new projects in safety and sustainability.

The following are specific examples of current safety-related projects sponsored by Ford’s Global Research and Advanced Engineering Organization:

- Wayne State University’s Bioengineering Department is evaluating surrogates for child lateral impact crash testing. Child crash-test dummies for side impact evaluation of vehicles are a recent development. Their designs are based on scaling from adults, but children have unique biomechanical properties and are not just small adults. This project seeks to understand how the new child crash-test dummies perform in simulated side impact crashes and how to improve their design.
- The University of Michigan is working on the performance characterization and modeling of lithium-ion batteries subjected to deformation under crash loading, as well as the development of multiphysics modeling capability to include mechanical, thermal and electrical effects.
- RWTH Aachen University is working on the development of advanced crash simulation methodology. This research seeks new methods to predict and accurately assess the crash performance of vehicle structures made with advanced materials.
- Tianjin University of Science and Technology is helping Ford to develop the world’s first human body mathematical model of a six-year-old child. Data from

CT scans of a representative six-year-old child were used to determine the physical geometry of the skeleton and internal organs. This data was then used to develop a mathematical representation in the virtual world of a human six-year-old child. When completed, this model may help Ford scientists and engineers better understand how injury to children occurs in vehicle crashes and research ways to reduce risk of injury to children in those crashes.

Post-Crash Response Technologies

One method of assisting emergency responders to reach the scene of a vehicle crash quickly is through in-vehicle emergency call systems, also called post-crash notification. These systems can help occupants to summon assistance in an urgent situation.

Ford Technologies

SYNC® is Ford's in-car connectivity system that provides a way for drivers to use cell phones and MP3 players through voice commands while keeping their eyes on the road and hands on the wheel. SYNC-equipped vehicles in the U.S., Europe and other regions of the world come with an occupant communications capability called **SYNC 911** Assist (in the U.S.) or **Emergency Assistance** (in Europe, China, India and Australia). This is a nonsubscription call-for-help system. In the event of a severe crash, the ability to directly contact the local emergency operator could be critical, for both the vehicle occupants and first responders. While any cell phone alone could be used in an emergency situation, SYNC can assist in placing a call to an emergency operator and provide GPS location information to help locate the vehicle. SYNC places an emergency call if an airbag is deployed or the fuel pump shutoff is activated as a result of an accident – when a phone is turned on, previously paired via Bluetooth and properly connected to SYNC. SYNC gives the occupants a choice as to whether or not to make the emergency call, and places the call if the occupant does not respond after a short time. Using SYNC's voice capabilities, Emergency Assistance alerts emergency service providers in the correct local language.

The **SOS-Post Crash Alert System™**, which is standard equipment on most Ford and Lincoln vehicles, is another advance in post-crash safety technology. The SOS-Post Crash Alert System automatically sounds the horn (except in Europe where horn activation is not allowed) and activates the emergency flashers in the event of an air bag deployment or safety belt pre-tensioner activation. In addition, the vehicle doors automatically unlock subsequent to an air bag deployment or safety belt pretensioner activation, to aid in rescue. The system is designed to alert passersby and first responders to the vehicle's location.

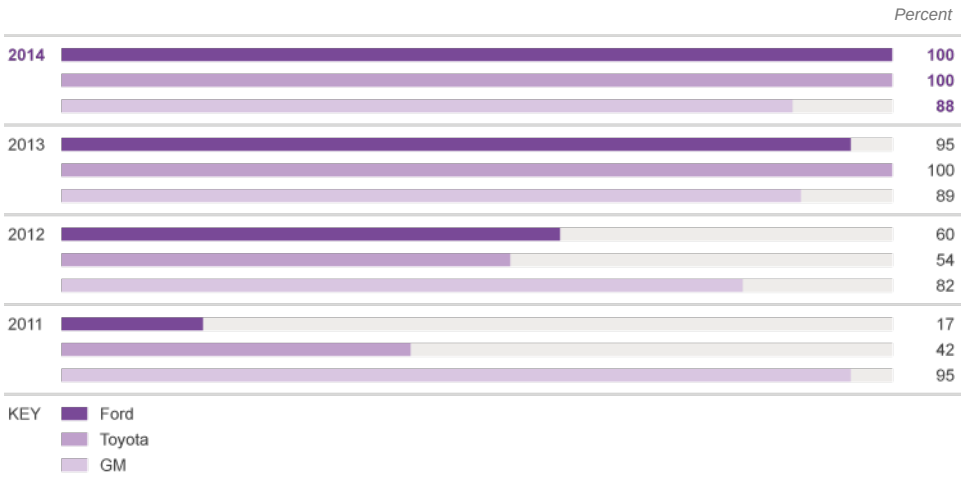
Data

Data on this page

View all data on this page as charts | tables

A. Percent of Nameplates Achieving 4-star or Better NCAP Overall Vehicle Score (OVS)

Data are for the model year noted.



	2011	2012	2013	2014
Ford	17	60	95	100
Toyota	42	54	100	100
GM	95	82	89	88

Third party rated (NHTSA)

Data notes and analysis

Beginning with the 2011 model year the National Highway Traffic Safety Administration (NHTSA) significantly changed its New Car Assessment Program (NCAP) and added a new metric, the Overall Vehicle Score (OVS), a calculation based on data from frontal crash, side crash, and rollover evaluations. We are simplifying our metrics and reporting NHTSA's OVS. For detailed information on the NCAP system, see www.safercar.gov, and in particular http://www.safercar.gov/staticfiles/toolkit/pdfs/faq.pdf (pdf, 218Kb).

Related links

This Report

- Vehicle Safety and Driver Assist Technologies
- How We Manage Vehicle Safety

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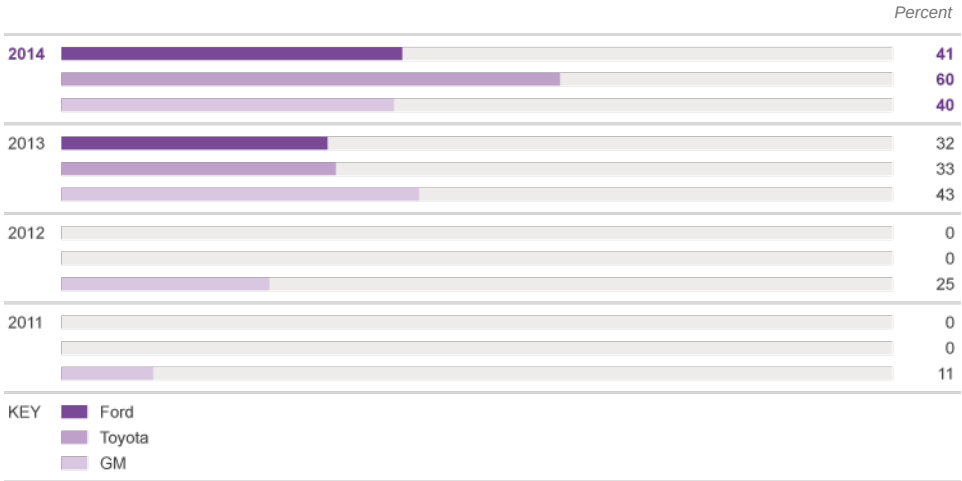
B. Percent of Nameplates Achieving 5-star NCAP Overall Vehicle Score (OVS)

Data are for the model year noted.



	2011	2012	2013	2014
Ford	0	0	32	**41**
Toyota	0	0	33	**60**
GM	11	25	43	**40**

Third party rated (NHTSA)

Data notes and analysis

Beginning with the 2011 model year the National Highway Traffic Safety Administration (NHTSA) significantly changed its New Car Assessment Program (NCAP) and added a new metric, the Overall Vehicle Score (OVS), a calculation based on data from frontal crash, side crash, and rollover evaluations. We are simplifying our metrics and reporting NHTSA's OVS. For detailed information on the NCAP system, see www.safercar.gov, and in particular http://www.safercar.gov/staticfiles/toolkit/pdfs/faq.pdf (pdf, 218Kb).

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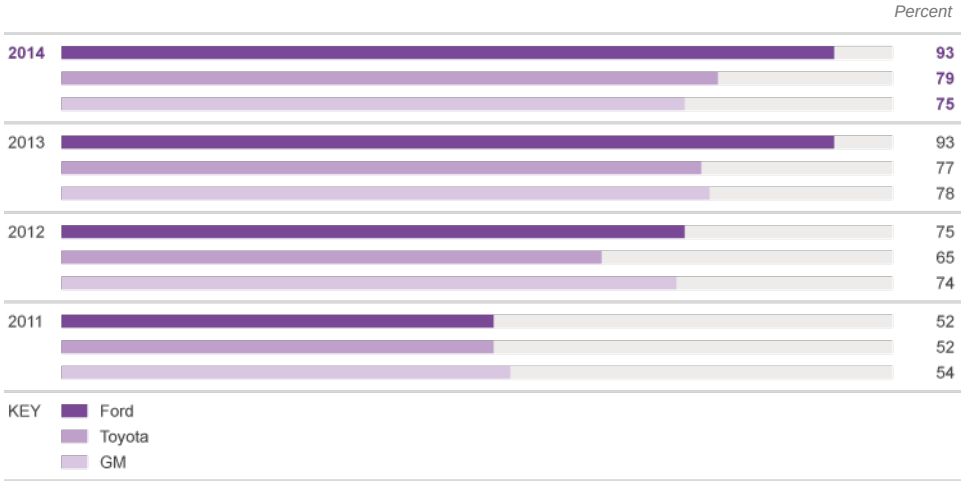
C. Percent of Nameplates Achieving IIHS Top Safety Pick by Manufacturer

Data are for the model year noted.



	2011	2012	2013	2014
Ford	52	75	93	**93**
Toyota	52	65	77	**79**
GM	54	74	78	**75**

Third party rated (IIHS)

Data notes and analysis

To earn an Insurance Institute for Highway Safety (IIHS) Top Safety Pick (TSP), a vehicle must receive “good” ratings in front, side, roof strength, and head restraint assessments. In 2013, IIHS began awarding Top Safety Pick+ (TSP+) for vehicles earning good ratings in all four of the above-mentioned evaluations plus at least an “acceptable” rating in a new small overlap frontal crash. In addition to the TSP awards, Ford received two TSP+ awards for 2013 MY vehicles. For detailed information on the IIHS’s testing procedures, see http://www.iihs.org/ratings/.

Related links

This Report

- Vehicle Safety and Driver Assist Technologies
- How We Manage Vehicle Safety

External Websites

- IIHS

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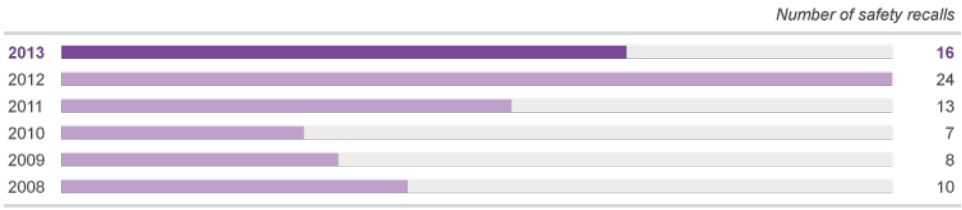
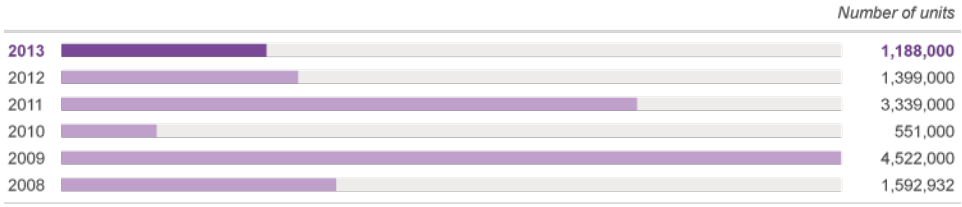
D. U.S. Safety Recalls





	2008	2009	2010	2011	2012	2013
Number of safety recalls	10	8	7	13	24	**16**
Number of units	1,592,932	4,522,000	551,000	3,339,000	1,399,000	**1,188,000**

Reported to regulatory authorities (NHTSA)

Data notes and analysis

Three of the 2012 calendar year safety recalls were reported by NHTSA in January 2012, although they were approved by the Company in December 2011. Additionally, three other 2012 calendar year safety recalls were supplements to safety recalls that were originally approved by the Company in 2010 and 2011.

Related links

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- Vehicle Safety and Driver Assist Technologies

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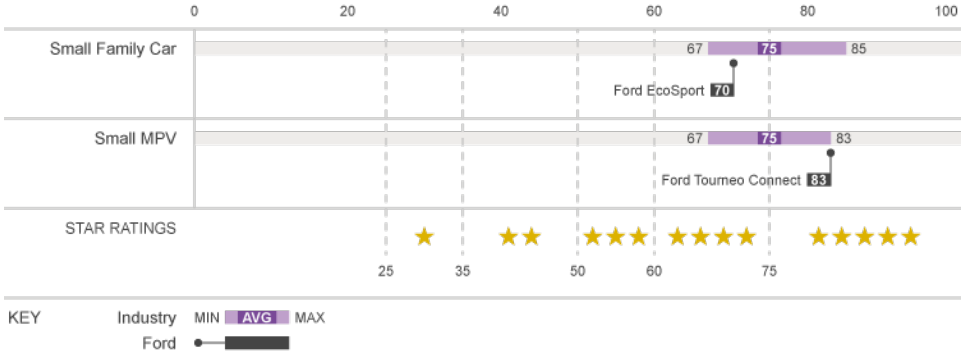
E. Euro NCAP (2013 Ratings)

Overall percentage



	Industry Low	Industry High	Industry Average	Ford results
Small Family Car	67	85	75	Ford EcoSport: 70
Small MPV	67	83	75	Ford Tourneo Connect: 83

Third party rated (Euro NCAP)

Data notes and analysis

EuroNCAP combines all assessed criteria to an overall “fulfillment percentage” ranging from 0 percent to 100 percent. Star ratings are dependent on the fulfillment percentage. Currently a 75 percent or higher is required for a 5-star rating. In addition to the star ratings, five Ford vehicles received “Euro NCAP Advanced” rewards for new safety technologies in the 2012 ratings. For additional information, go to www.euroncap.com.

Related links

This Report

- Vehicle Safety and Driver Assist Technologies
- How We Manage Vehicle Safety

External Websites

- Euro NCAP

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Case Study: Public Domain Ratings

Safety regulations and public domain rating programs differ around the world, and they are constantly evolving in response to various regional factors. The public domain rating programs that perform vehicle crash testing and other assessments have regularly updated their testing protocols and evaluation criteria to reflect the needs of the region. In the past two years, several of these programs have markedly revised their vehicle rating systems, making it increasingly difficult to achieve the highest ratings. The changes have also caused the testing protocols to become even more inconsistent and divergent between regions. Some of the changes include the addition of new assessment items (such as different-sized dummies in different seating positions), different or more-stringent crash evaluation criteria, and greater emphasis on accident avoidance and driver assist features. A major challenge for a global automotive company like Ford is that the complexities of these evolving programs may initiate a demand for different vehicle technology offerings in different markets.

In addition, New Car Assessment Program (NCAP) systems are being launched in regions where they have not existed in the past. This is partly due to the influence of a new nonprofit organization based in London called Global NCAP that is promoting the establishment of NCAPs around the world. They have already helped to develop a Latin NCAP system, which is now rating vehicles in Mexico and South and Central America. In 2012, a new ASEAN NCAP was launched in Malaysia.

A full-vehicle crash test.

In the U.S., the NCAP program of the U.S. National Highway Traffic Safety Administration (NHTSA) includes a 35 mph (56 km/h) full frontal impact test, a side impact test consisting of a moving barrier and a rigid pole, and a static stability rating. NHTSA also provides an overall vehicle score (a “star” rating, from one to five stars) representing a combination of the vehicle’s front, side and rollover ratings.

Evaluations conducted by the Insurance Institute for Highway Safety (IIHS) include a 40 mph (64 km/h) frontal offset (40 percent overlap) crash test, a side crash test with a higher barrier, a roof strength test, plus evaluations of head restraints in a rear-impact simulation. To earn a Top Safety Pick from the IIHS, a vehicle must receive “good” ratings in the front, side, roof and head restraint assessments. Beginning in the 2013 program, the IIHS added a small (25 percent) overlap frontal test, simulating minimum engagement or an impact with a narrow object, to their Top Safety Pick rating system. Vehicles that perform at a “good” or “acceptable” level in this new small offset test will earn an IIHS Top Safety Pick+ award. For 2014, a “good” or “acceptable” level in this new small offset test is required to earn an IIHS Top Safety Pick. In addition to the 2014 Top Safety Pick criteria, a minimum “Basic” rating in the new IIHS Forward Crash Prevention protocol required to earn an IIHS Top Safety Pick+ award.

Euro NCAP conducts a 64 km/h (40 mph) frontal offset (40 percent overlap) crash, a side crash and a side pole impact, as well as pedestrian protection and child safety evaluations. Recent changes to the Euro NCAP include updated pedestrian protection and speed assistance protocols. Like NHTSA, Euro NCAP also gives each vehicle an overall star rating representing a combination of individual assessments. In addition to publishing the main vehicle ratings, Euro NCAP has added an Advanced Rewards program to recognize certain safety and accident avoidance technologies that are not currently rated under their protocols. Euro NCAP has also announced significant changes to its rating system between 2014 and 2016. These changes are far-reaching and include a stronger focus on accident avoidance and driver assist features, new and revised crash tests and dummies, and changes to the assessments for pedestrian and child safety.

The emerging testing and assessment methods being developed by Global NCAP are based on existing protocols – typically those from Euro NCAP. In 2013 Latin NCAP introduced significant changes to their program affecting areas such as child restraints, child dummies, applicability of the ratings, fitment rates for safety equipment, seat belt reminders and new requirements for five-star ratings. In addition, revisions to the China and Australasian NCAP programs are planned in stages and began taking effect in 2011. In 2012, changes to China NCAP included increasing the offset frontal impact test speed from 56 km/h to 64 km/h, the introduction of whiplash assessments and the inclusion of rear dummy assessments in the ratings. The Australasian NCAP has published a rolling, five-year “road map” detailing changes they plan to introduce through to the end of 2017. These include whiplash and roof-strength assessments and increased

requirements for accident avoidance and driver assist technologies.

Thus, even though Ford vehicles are safer than ever, individual vehicle crash ratings achieved for the 2011 model year and beyond should not be compared to ratings achieved prior to 2011. (See the Data page.)

In addition, while some of the basic test methods are similar in the global evaluation programs, each program varies in the ways in which vehicle ratings are determined. This means that for an identical car, achieving the highest rating in one region or evaluation program does not guarantee the same result in another region or program.

Just as rating programs vary by region, so do regulations, road infrastructure, the competitive landscape and other factors that can influence real-world safety. We work to understand all of these variables and to deploy and offer safety features that meet the needs of the region. And we continue to invest in new technologies to prepare for future societal needs. At Ford, we strive to make technology available on a wide range of our products, even as we remain competitive in the markets in which Ford vehicles are sold. This approach promotes greater societal benefits through broad market acceptance of new technologies, which ultimately improves real-world safety.

Related links

External Websites

- Australasian New Car Assessment Program
- China New Car Assessment Program
- Global New Car Assessment Programme
- Insurance Institute for Highway Safety
- Latin New Car Assessment Program
- U.S. National Highway Traffic Safety Administration
- European New Car Assessment Programme

Case Study: Electrified Vehicle Safety

Anyone who owns an electrified vehicle (EV) can attest that the experience of driving an EV is essentially the same as that of a "regular" vehicle powered by an internal combustion engine. Certainly no special skills are needed to operate EVs such as hybrids, plug-in hybrids or pure battery electric vehicles.

2014 Ford Fusion Energi

Under the hood, however, EVs are, in fact, different from non-electrified vehicles in at least one important respect: they contain a battery with 300+ volts of power, whereas a regular vehicle has just one 12-volt battery.

And that means that first responders – the firefighters, police officers and emergency medical technicians who show up at the scene of a crash site – may indeed need some special knowledge and skills to be able to safely address a vehicle crash involving an EV.

"It's not uncommon for first responders to need to update their skills and procedures in response to new technologies," said Domenico Gabrielli, vehicle safety engineer in Ford's Automotive Safety Office. "For instance, the advent of high-strength steels and new types of airbags required a modification of tools and procedures. Likewise, in recent years the industry has been focused on educating first responders about EVs."

For example, we and other EV manufacturers have developed special Emergency Responder Guides for each of our electric vehicles. These guides include information on how to identify a Ford EV, locate the high-voltage system, disconnect it, and move and store the disabled vehicle, among other key tasks. Also, over the years, we have actively supported firefighters' hands-on crash-response procedure training events, through the donation of EVs and the attendance of Ford technical personnel.

In 2010, we began working with the National Fire Protection Association (NFPA) to help reach more first responders and educate them about electric vehicles. We take part in conferences on the topic that are jointly hosted by the NFPA and the Society for Automotive Engineers (SAE). We also solicited (and incorporated) the NFPA's feedback on our Emergency Responder Guides.

The NFPA has since developed a website for first responders, where our and other automakers' guides are housed. Also, the NFPA developed the Emergency Field Guide – a quick reference guide that summarizes the key information that first responders need for all makes and models of EVs.

"Our comprehensive training programs – both classroom-based and online – have reached at least 35,000 first responders," said Andrew Klock, senior project manager at the NFPA. "And the classroom programs are 'train-the-trainer' courses, so we know the lessons taught there are being cascaded out to many, many more first responders."

The NFPA is also working with the Fire Protection Research Foundation, which is currently conducting a study on high-voltage battery fires and best practices for extinguishment. That work is funded in part by the Alliance of Automobile Manufacturers, of which we are a member.

Ford has also been involved in the SAE's efforts to develop recommended standard procedures for first responders regarding EVs involved in crashes. Several Ford engineers served on the committee that developed the procedures, which were published in February 2013.

"It's important to note," said Gabrielli, "that automakers and government regulatory agencies have worked hard to ensure that EVs are safe in the event of a crash." All EVs in the U.S., for instance, must comply with the National Highway Traffic Safety Administration's regulations governing the safety of EVs. Ford also complies with similar regulations in force in other countries around the world.

Ford also has internal guidelines for EVs, governing all aspects of battery safety and crash protection. In our EVs, for example, the high-voltage battery is housed in a strong steel casing, which helps to provide protection in addition to the car's overall safety structure. "From the beginning, our electrified vehicles are designed for safety," said Gabrielli.

First responders have long been used to addressing the risks associated with “regular” vehicle crashes, which may involve the spillage of large quantities of flammable liquid. EVs have unique issues that first responders also need to learn how to handle. But we’re confident that the efforts of Ford and others in the industry are helping to ensure that first responders have the information they need to do their jobs safely.

Related links

This Report

- Electrification: A Closer Look

External Websites

- National Fire Protection Association
- Society for Automotive Engineers

Case Study: Driver Distraction

Smart phones and other portable electronic devices (e.g., MP3 music players) are commonplace in our modern society. The public has become accustomed to using these devices everywhere – at home, on the street, in restaurants, at the office, while shopping, and – of most interest to Ford's safety researchers – while driving. Indeed, studies by the National Highway Traffic Safety Administration indicate that approximately 10 percent of drivers are using their cell phones at any given time, which has heightened concerns about the potential for driver distraction.

Ford agrees that this is an important safety issue, and we have taken steps to address it. We also believe that continued research is needed to better understand the complex interactions involved in this issue, and we are participating in that research.

Some entities have recommended a total ban on the use of cell phones – both hand-held and hands-free – while driving, citing studies that concluded there's no difference in driver behavior whether using hand-held or hands-free phones. In many of those laboratory studies, participants in simulated driving situations were observed while being asked to engage in in-depth conversations on challenging or emotional subjects, such as the latest political scandal or a near-death experience. Such intense and lengthy discussions can indeed be distracting.

Naturalistic driving studies – in which study participants' driving performance, "eye glance behavior," driving environment and in-vehicle activities are observed and recorded over weeks or months in real-world situations – have revealed different results. For example, naturalistic studies by the University of Michigan Transportation Research Institute found that, when immersed in real traffic conditions, drivers using cell phones by and large exhibit prudent driving behavior.

Naturalistic driving research has found that visual distraction, not cognitive distraction, is the main safety concern in the real world. In fact, researchers from the Virginia Tech Transportation Institute (VTTI) found that 80 percent of all crashes, and 65 percent of all near-crashes, involved the driver looking away from the forward roadway just prior to the onset of the incident. These researchers summarized their findings in this way: "... it is a rare case that a crash occurs while the driver's eyes are on the forward roadway, regardless of any other 'cognitive demand' that they might be engaged in."

Beyond this, there exists a considerable body of published research that indicates the superiority of hands-free voice interfaces as compared to hand-held or visual/manual interfaces for the same tasks of command or data entry. These studies show advantages in driver performance, eye glance behavior toward the roadway, and object and event detection when the driver can keep eyes on the road and hands on the wheel.

For over a decade, Ford has been focused on the issue of driver distraction, and we've taken steps to enhance driving safety for those who use cell phones and other telematics devices while driving.

Ford's SYNC® technology, our voice-activated in-car connectivity system, has been shown to significantly enhance the ability of drivers to attend to the driving task while using cell phones and music players. Ford researchers found that SYNC substantially reduces drivers' eyes-off-road time and improves lane-keeping, speed maintenance, and object and event detection response times, when compared to hand-held devices for the same tasks. Our research evaluated driver performance, not driver behavior in the real world, and our findings are consistent with the research conducted by VTTI, which we believe indicates that SYNC helps to enhance highway safety overall.

Ford SYNC®

Ford recognizes that drivers will in fact use cell phones and music players while driving, and that text messaging will continue to increase in popularity. Text messaging is a particular concern, as it requires significant time looking away from the roadway to do it. Ford's SYNC system addresses this concern as well: when a text message arrives, it does not display that message but instead reads it aloud through text-to-speech technology. In addition, SYNC allows the driver to potentially respond via speech-to-text rather than manually keying-in a reply.

We believe that ongoing education is needed to help drivers understand the importance of focusing on the

driving task and keeping their hands on the wheel and eyes on the road. Ford plans to continue to work with the government and other safety-related groups to discuss measures that can effectively reduce driver distraction and improve driving safety. We also plan to participate in continued research that can further our understanding of safe driving and help spread the message of safe driving.

Related links

External Websites

- U.S. National Highway Traffic Safety Administration
- Virginia Tech Transportation Institute

Voice: Pete Hardigan

Director of Sustainability, Environment and Safety Engineering, Asia Pacific, Ford Motor Company

> "Safety regulations can vary significantly from market to market, but we meet and exceed all requirements where we operate. Public domain assessment programs also vary. There are currently five different New Car Assessment Programs (NCAPs) in Asia, with a sixth one in development. Moreover, the protocols within these NCAPs can change very frequently, often with very little lead time."

One of my primary roles at Ford Motor Company is to make sure that our vehicles meet all safety and environmental regulations in the Asia Pacific region. In doing so, it's important to keep in mind that Asia isn't just one market. It's an enormously diverse area that includes some countries with highly developed transportation networks and experienced drivers, other countries with underdeveloped infrastructure and many novice drivers. Improving safety requires addressing three key elements: human behavior, vehicle safety and the environment.

On the human behavior front, one of the most fundamental occupant safety factors is safety belt use. Safety belt use is relatively low in Asia Pacific markets. Traveling around Asia, one frequently sees passengers moving around inside vehicles and even children standing up in moving vehicles. Data is very clear that the use of safety belts is key to reducing the occurrence of injuries and fatalities in the event of an accident.

In Asia, a unique challenge is the sheer number of first-generation drivers on the roads. In developing Asian markets in particular, more and more people are able to afford vehicles and are taking to the roads for the first time. Many of these drivers are the first in their families to own or even drive a car or truck, so there is no tradition of learning the basics of how to drive from one's parents. Novice drivers have an increased crash risk because they may not possess judgment related to driving skills that comes with experience. These new drivers may underestimate the implications of their driving behaviors and have greater potential to engage in multiple tasks, such as texting while driving.

That's why we work hard to help educate and provide drivers in Asia with better training. Our Driving Skills for Life program has helped to train 77,000 licensed drivers in 330 cities across eight different Asia Pacific markets. In the U.S., the program focuses on teenage drivers. But in emerging markets, we focus on novice drivers of every age.

Driver training is one element of our three-pronged, integrated approach to safety at Ford. The second element incorporates safety and driver assist technology – building technologies into our vehicles to help drivers avoid accidents or mitigate the impacts when accidents do occur.

With respect to vehicle safety, our goal is to design vehicles that achieve a high level of safety for a wide range of people, over a broad spectrum of real-world conditions. Ford applies a set of basic safety tenets and technologies that we build into our vehicles globally. Our Safety Design Guidelines (SDGs) are design targets intended to enhance the already extensive company efforts to provide vehicles that exhibit a high level of safety. Safety is one of our core brand pillars, representing some of the key things customers care about and the work we do to deliver our One Ford plan. Our Public Domain Guidelines (PDGs) focus specifically on helping to strengthen Ford brands globally in relevant public domain assessments.

Safety regulations can vary significantly from market to market, but we meet and exceed all requirements where we operate. Public domain assessment programs also vary. There are currently five different New Car Assessment Programs (NCAPs) in Asia, with a sixth one in development. Moreover, the protocols within these NCAPs can change very frequently, often with very little lead time. Our SDGs and PDGs are some of the enablers that assist our vehicles in meeting their design targets.

The third element focuses on the road environment – what can Ford, along with other manufacturers and governments, do to help improve transportation infrastructures? This latter element requires input and action from many groups of stakeholders. It is clear, however, that enhancing motor vehicle safety requires a holistic view focusing on all three elements.

In the U.S. and Europe, there are hundreds of millions of vehicles on the roads with record-low rates of fatalities. This is the result of focusing on all three elements: human behavior, vehicle safety and the environment. It will be important to take the experiences from the U.S. and Europe and understand how they might be adapted to the unique circumstances in Asia Pacific.

For Ford, Asia Pacific is a great example of our One Ford system at work, and we would not be as successful as we are without our global One Ford team. We're taking processes and products from around the globe and we're introducing them in Asia while meeting all the differing regulatory requirements.

It is very exciting to work in the region and I am proud to be a part of such a great global company.

(For more on vehicle globalization, see the John Fleming voice.)