

Vehicle Safety

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During 2008 we:

- Achieved superior crash-test results
- Unveiled new accident avoidance features

We are continuously enhancing the safety of our vehicles and sharing safety research and technologies across all of our brands. In 2008, our efforts were once again rewarded, and we set new standards for safety test performance. Based on the independent measures listed below, Ford is now the industry leader in motor vehicle safety.

- Ford holds the most Top Safety Picks (awarded by the Insurance Institute for Highway Safety, or IIHS) of any vehicle manufacturer. Fourteen Ford vehicles earned this honor in early 2008 (compared with eight in 2007), including the 2009 Ford Taurus, Taurus X, Edge, Flex, Escape and Fusion; Mercury Sable, Milan and Mariner; Lincoln MKX and MKS; and Volvo S80, C70 and X90. To earn a Top Safety Pick, a vehicle must receive a rating of "good" in offset frontal impact, side impact and rear impact evaluations and offer electronic stability control.¹
- For the 2009 model year, 24 Ford vehicles received five-star ratings for both frontal impact and side impact from the National Highway Traffic Safety Administration (NHTSA) in its U.S. New Car Assessment Program (NCAP) ratings, compared with 15 for the 2008 model year.
- The 2009 Ford Taurus is the safest-rated large sedan sold in America, with five-star NCAP crash ratings for frontal and side impact and "good" IIHS ratings in offset frontal impact, side impact and rear impact evaluations.
- The 2009 Ford F-150 is America's safest full-size pickup. It's the only pickup to earn five-star crash-test ratings in all categories from NHTSA *and* be named a Top Safety Pick by the IIHS.
- The 2009 model year Mustang Convertible earned five-star ratings in all categories of NHTSA NCAP.
- For the 2009 model year, the IIHS awarded 28 Ford vehicles with "good" ratings for frontal offset performance and 16 Ford vehicles with "good" ratings for side impact performance.
- In the most recent EuroNCAP assessments, the Ford Kuga and Ford Fiesta achieved Ford's first three-star ratings for pedestrian protection. These cars also joined the Focus, Mondeo, S-MAX and Galaxy in having best-in-class, five-star adult protection and four-star child protection ratings.
- EuroNCAP gave the Volvo XC60's WHIPS system the highest-possible score when it tested whiplash protection systems for the first time in 2008.
- The Ford Mondeo became the second Ford car (after the Focus) to be awarded a five-star rating in the Chinese New Car Assessment Program.
- The Ford Falcon was the first Australian-built car to be awarded five stars in the Australasian New Car Assessment Program (ANCAP).

In addition to achieving superior performance in government-sponsored safety tests, Ford received the following recognitions for the safety of its vehicles.

- In safety ratings published by the French magazine *Auto Plus* in February 2009, all six of the Ford vehicles assessed were rated as "good" (the highest rating). A Ford vehicle came first in three out of the five categories – the Focus was rated the #1 small family car, the Mondeo the #1 large family car and the Volvo XC60 the #1 SUV. In addition, the Focus received the highest score of all the cars assessed.
- Centro Zaragoza, the Spanish insurance organization, awarded the Ford Mondeo, Ford S-MAX, Volvo XC60 and Volvo XC90 with Best Safety Awards in their respective categories.
- Ford vehicles also recently performed exceptionally well in low-speed damageability bumper tests



PERSPECTIVES ON SUSTAINABILITY

Dr. Adrian K. Lund

President, Insurance Institute for Highway Safety and the Highway Loss Data Institute

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RELATED LINKS

Vehicle Web Sites:

- Ford Taurus
- Ford Taurus X
- Ford Edge
- Ford Flex
- Ford Escape
- Ford F-150
- Ford Fusion
- Ford Mustang
- Mercury Sable
- Mercury Milan
- Mercury Mariner
- Lincoln MKX
- Lincoln MKS
- Volvo S80
- Volvo C70
- Volvo XC60
- Volvo XC90
- Ford Kuga

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carried out by Thatcham (a UK-based safety research organization), based on the international standard bumper test developed by the Research Council for Automobile Repairs. The Ford S-MAX was the only vehicle tested to achieve the highest rating.

- The Volvo XC60's new [City Safety system](#) has received awards in Europe and the U.S., from the following automotive publications and organizations:
 - ■ *Autohoje* 2009 (Portugal)
 - ■ *FuturAuto* 2009 (Belgium)
 - ■ *L'Automobile Magazine* 2008 (France)
 - ■ *Autocar* 2008 (Greece)
 - ■ *Auto Motor und Sport*, Paul Pietsch Award 2009 (Germany)
 - ■ NHTSA, Traffic Safety Achievement Award 2008 (US)
 - ■ Thatcham, British Fleet World Honours Awards 2008 (UK)

This section outlines our vehicle safety performance over the past year. It includes a discussion of current [vehicle safety challenges and opportunities](#) globally, and [how we manage vehicle safety](#) within the Company. It also focuses on technologies we've developed, programs we support and research we are undertaking to promote [safer driving](#), how we manufacture [ever-safer vehicles](#), and how we promote a [safer driving environment](#). Particular emphasis is placed on recent developments in accident avoidance technologies. Finally, the section looks at the various ongoing [collaborative efforts](#) we are undertaking with other organizations related to vehicle safety.

1. The Ford F-150 met these requirements later in 2008, bringing Ford's total number of current Top Safety Picks to 15.

Ford Fiesta
Ford Focus
Ford Mondeo
Ford S-MAX
Ford Galaxy
Ford Falcon

External Web Sites:

Insurance Institute for
Highway Safety
National Highway Traffic
Safety Administration
European New Car
Assessment Programme
Australasian New Car
Assessment Program
Auto Plus
Centro Zaragoza
Thatcham

Challenges and Opportunities

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Traffic safety is a growing public health challenge, particularly in developing countries. Worldwide, approximately 1.2 million people die each year in traffic accidents. The vast majority of those fatalities – more than 1 million – occur in countries with low- and middle-income economies.

The World Health Organization (WHO) estimates that deaths due to road traffic accidents will increase to 2.4 million in 2030, primarily owing to increased motor vehicle ownership and use associated with economic growth in low- and middle-income countries. In addition, road traffic accidents are expected to emerge as the fourth-leading cause of death in 2030 – rising from the ninth-leading cause in 2004.

Road traffic crashes are already the leading cause of death among young people between 15 and 19 years old, according to a new report published by the WHO. The report says that nearly 400,000 young people under the age of 25 are killed in road traffic crashes worldwide every year. Millions more are injured or disabled. The vast majority of these deaths and injuries occur in low- and middle-income countries.

Many of the traffic deaths in developing nations involve pedestrians and/or motorcycles. As mobility increases in developing markets, people initially use two-wheeled motor vehicles, and the incidence of traffic accidents rises. As people migrate to automobiles, traffic accidents and injury levels generally decrease.

During this transition, holistic solutions are required, including infrastructure improvements, the modification of road user behavior and the enforcement of traffic laws. According to the WHO, some of the most cost-effective measures for reducing traffic deaths and injuries include separating pedestrians from motor vehicles on roadways, installing traffic signals, enforcing traffic laws and mandating the use of safety belts.

One critical task is to educate drivers about the most important primary safety feature – safety belts. Continued improvements in vehicle safety are also very important, and we at Ford continue to take seriously our responsibility to build safe vehicles.

In both developed and emerging markets, it is increasingly important for road safety stakeholders to work together using an integrated approach to ensure the maximum benefits are delivered from any given safety initiative. To support this approach, we at Ford seek ways to partner with governments, nongovernmental organizations and other stakeholders to identify the best opportunities to promote safety based on real-world data. We have become more involved in encouraging new and innovative ways to modify road user behavior (for example, through new technologies, driver education efforts and working with government agencies such as the UK Driving Standards Agency) and encouraging infrastructure and enforcement improvements in the communities in which we operate.

This vehicle safety section details our latest efforts and achievements in all of these areas. [Our mobility project](#) considers these challenges and offers alternative urban mobility approaches for developed and emerging economies.

Findings of the Materiality Analysis

We analyzed the importance of vehicle safety to our Company and stakeholders as part of the materiality analysis conducted for this report. In that analysis, vehicle safety was identified as one of a small set of material issues for the Company. Customers are showing greater concern for vehicle safety and making it a higher priority in purchase decisions, while other stakeholders, including nongovernmental organizations, tend to focus on particular aspects of safety. There is a trend toward increased regulation of vehicle safety worldwide, and inconsistent regulations can create barriers to trade. An emerging societal and competitive issue for us at Ford is how to respond to the growing consumer interest in in-vehicle communication, navigation and entertainment systems while maintaining or improving vehicle safety (see [Materiality Analysis](#)).

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In This Report:
[Materiality Analysis](#)
[Mobility](#)

External Web Sites:
[World Health Organization](#)

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Here at Ford, our objective is to design and manufacture vehicles that achieve high levels of vehicle safety for a wide range of people over the broad spectrum of real-world conditions. Real-world safety data, 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 targets that exceed regulatory requirements and define many additional requirements that are not regulated. The PDGs are Ford guidelines that focus specifically on helping to ensure that our vehicles earn top marks in relevant public domain assessments.

Both SDGs and PDGs are managed on a global basis and address the local needs of individual regions and markets. Awareness of road safety is rapidly increasing in many emerging markets, most notably in China, where vehicle safety performance is quickly catching up to that of mature markets. In 2008, Ford created new China-specific SDGs and PDGs to address this issue – raising the bar for vehicle performance in this emerging market beyond regulatory requirements.

Government-run New Car Assessment Programs are becoming an increasingly important tool to improve consumer awareness in emerging markets such as China, but their relevance in developed markets is still also very strong. This is likely to remain the case between 2009 and 2012 as both the National Highway Traffic Safety Administration NCAP and EuroNCAP ratings systems are being significantly altered. As such, fewer vehicles (of all makes) will receive top ratings. Ford is working hard to meet this challenge. We have taken active roles working with NHTSA and EuroNCAP to help ensure the respective rating schemes will be appropriate and will deliver additional real-world benefit. Ford is continuing to work with NHTSA to address several remaining concerns about the new NCAP test requirements before they are implemented.

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 even more stringent internal guidelines. Our state-of-the-art crash-test facilities include the Safety Innovation Laboratory in Dearborn, Michigan, the Volvo Car Safety Centre in Gothenburg, Sweden, and the extensive crash-test facilities in Merkenich, Germany, and Dunton, England.





Global Technical Regulations

The automotive industry is highly regulated, and two systems of vehicle regulation currently predominate globally: the United Nations Economic Commission for Europe (UNECE) Regulations and the U.S. Federal Motor Vehicle Safety Standards. A limited number of countries (including Canada and Mexico) base many of their regulations on U.S. requirements, but the members of the European Union (EU) and much of the rest of the world are increasingly adopting the UNECE regulations or regulations based upon them.

When countries or regions have different regulatory requirements or add unique additional requirements

RELATED LINKS

- External Web Sites:
- National Highway Traffic Safety Administration
 - European New Car Assessment Programme
 - Global Technical Regulations

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to standard U.S. or UNECE regulations – purportedly to meet the same overall safety objectives – manufacturers must modify their vehicle designs and features to meet the different regulations of the various markets. This increases vehicle complexity and cost, usually with no additional real-world safety benefit.

With the aim of harmonizing world vehicle regulations, the so-called "1998 Agreement" was established.¹ The 1998 Agreement has the backing of all the world's major vehicle-producing countries. At present there are 31 contracting parties to the Agreement, including the United States, Japan, Canada, Russia, South Korea, South Africa, India, the EU and a number of individual EU member states. As a result of the 1998 Agreement, which is administered by UNECE Working Party 29, the signatory countries have begun to work together to develop harmonized Global Technical Regulations (GTRs).

Ford Motor Company participates in the GTR development process. The first GTR was published in 2004, and since then eight more have been developed. GTRs for head restraints, safety glazing, electronic stability control systems and pedestrian protection were completed in 2008.

Progress toward true harmonization (i.e., complete alignment of regulations within a GTR) has been challenging, due to the difficulty of reconciling varied national requirements and the historical differences of existing regulations. Despite these challenges, Ford continues to believe that harmonization has the potential to significantly reduce global complexity while maintaining high levels of vehicle safety, security and environmental performance, and we will continue to support the harmonization of global regulations via the 1998 Agreement.

1. Officially, "The 1998 Agreement Concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles."

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Vehicle safety is the product of complex interactions among the driver, the vehicle and the driving environment. We use the Haddon Safety Matrix (developed by William Haddon, a former NHTSA administrator and IIHS president) to take a holistic view of the factors that affect vehicle safety.


The Haddon Matrix looks at injuries 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. Another goal is to minimize the amount of time that elapses between the crash and when help arrives.

Haddon Safety Matrix

Click on the column headers for information and examples of our activities in each area

	 HUMAN BEHAVIOR	 VEHICLE SAFETY	 ENVIRONMENT
Pre-Crash (accident avoidance)	<ul style="list-style-type: none"> ■ Research ■ Education ■ Advocacy 	<ul style="list-style-type: none"> ■ Crash avoidance technologies ■ Security 	<ul style="list-style-type: none"> ■ Road design for accident avoidance ■ Traffic control
Crash (occupant protection)	<ul style="list-style-type: none"> ■ Technology and proper use 	<ul style="list-style-type: none"> ■ Crashworthiness 	<ul style="list-style-type: none"> ■ Road design for injury mitigation ■ Research
Post-Crash (injury mitigation)	<ul style="list-style-type: none"> ■ Telematics 	<ul style="list-style-type: none"> ■ Post-crash notification 	<ul style="list-style-type: none"> ■ Emergency medical services
Examples of Ford Actions (detailed in this section)	<ul style="list-style-type: none"> ■ SYNC® technology ■ MyKey™ ■ Driving Skills for Life ■ See Me Safe 	<ul style="list-style-type: none"> ■ SYNC® with 911 Assist ■ Accident avoidance features ■ Roll Stability Control® 	<ul style="list-style-type: none"> ■ Global Road Safety Partnership ■ Accident research

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Safer Driving

The U.S. Department of Transportation reports that human factors cause or contribute to more than 90 percent of serious crashes.

In the pre-crash stage, drivers can try to avoid crashes by practicing safe driving. In the crash and post-crash phases, drivers can help reduce the risk of injury by always properly using safety equipment such as safety belts. Ford Motor Company provides information, educational programs and advanced technologies to assist in promoting safe driving practices.

For example, numerous studies show that hands-free multimedia devices offer safety benefits compared to hand-held devices. The benefits are seen in driving performance as well as object and event detection. Ford's popular and award-winning SYNC® technology, powered by Microsoft®, provides a way for drivers to use cell phones and MP3 players more safely, because they can do so through voice commands alone while keeping their eyes on the road and their hands on the wheel. Ford SYNC was launched in late 2007 and is now available on nearly every vehicle from Ford, Lincoln and Mercury.

Beginning this year on select 2010 models, SYNC will be available with Traffic, Directions and Information, a subscription service that will allow drivers to access traffic reports, turn-by-turn directions and business news and information, all via voice command. Also, SYNC will be launched progressively on Ford's European product range beginning in 2010. (See the [case study](#) in this section for more on how SYNC helps to reduce driver distraction.)

In Europe, Ford currently offers the award-winning Ford Convers+ Human Machine Interface System. Available on the Mondeo, S-MAX and Galaxy, this system allows the driver to control multimedia functions such as cell phones, the navigation system and the radio via a five-way toggle on the steering wheel. A display screen is located on the instrument panel cluster. This combination of steering wheel toggle and cluster operation enables drivers to control multimedia devices with their hands on the wheel and eyes on the road. SYNC will complement FordConvers+ when it is introduced into the European line-up starting in 2010.



MyKey™ Insistent Beltminder™: If the MyKey driver and/or passenger does not buckle, then the vehicle will display a warning and mute the audio system.

Ford's MyKey™ system is an innovative new technology designed to help parents encourage their teenagers to drive more safely. MyKey allows owners to program a key that can limit the vehicle's top speed to 80 mph and the audio volume to 44 percent of total volume. MyKey encourages safety-belt usage by enabling Ford's Beltminder™ to chime every minute indefinitely until the safety belt is buckled, rather than ceasing after five minutes, and also by muting the audio system until the belt is buckled. In addition, MyKey provides an earlier low-fuel warning (at 75 miles to empty rather than 50); sounds speed-alert chimes at 45, 55 or 65 miles per hour; and will not allow manual override of other safety systems. MyKey will debut as standard equipment on the 2010 Focus coupe and will quickly become

5,400

Driving Skills for Life participants in Asia to date

778


schools in Illinois participated in Operation Teen Safe Driving

RELATED LINKS

In This Report:
Driver Distraction

Vehicle Web Sites:
Ford Focus
Ford Mondeo
Ford S-MAX
Ford Galaxy

External Web Sites:
SYNC®
Driving Skills for Life
Traffic Improvement Association
See Me Safe

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standard on many other Ford, Lincoln and Mercury models.

Driving Skills for Life (DSFL), Ford's driver education program, demonstrates our continued commitment to educating teens about safer driving. In 2008, Ford launched DSFL in the Philippines, Vietnam, Thailand and Indonesia, and has had more than 5,400 driver participants in those markets thus far. See the [case study](#) on this topic for more detailed information.

In the U.S., the DSFL program earned Ford the 2007 Traffic Safety Achievement Award for Community Service from the World Traffic Safety Symposium at the 2007 New York Auto Show. The U.S. program provides outstanding learning tools, including a DVD, printed materials and a redesigned Web site, to help young drivers improve their ability behind the wheel. In addition, the program includes information about eco-driving, car care tips and information for mature drivers.

Beginning in 2007, Ford partnered with the state of Illinois to launch a statewide effort – modeled on Driving Skills for Life – designed to reduce teen crashes and fatalities. Called Operation Teen Safe Driving, this campaign was the first of its kind and got high school students directly involved by challenging them to develop and implement a teen safe driving community awareness campaign using DSFL resources. This seven-month statewide effort involved 778 schools in 102 Illinois counties, and had the support of the governor, the secretary of state and the Chicago board of education.

The results were remarkable: Teen fatalities in the state fell by more than half in the year following the program's implementation, from 57 fatalities during January 1 – April 15, 2007, to 22 during January 1 – April 15, 2008. Based on this success, the program will now be expanded to include eight additional states and five additional cities.

Drivers aged 65 and over have the highest accident and traffic fatality rates among all age groups except for teenage drivers. Ford has recently redoubled its efforts to promote safer driving among older drivers, via the sponsorship of a pilot program with the nonprofit Traffic Improvement Association (TIA). This program enables older drivers to test their skills and evaluate their ability to safely operate motor vehicles. The TIA presented 38 Ford-sponsored, three-day workshops at hospitals and senior centers around Michigan in 2008, and even more will be offered in 2009. The classroom portion of the workshop, which educates older motorists about the effects of aging on reflexes and cognitive skills, teaches compensation skills for diminished abilities and reinforces fundamental defensive driving techniques. The program includes an on-the-road evaluation conducted by certified instructors in the students' own vehicles.

In another effort to promote safe practices, Ford has created – in partnership with Meharry Medical College – See Me Safe, a child passenger safety seat initiative aimed at reducing child injury, disability and death due to traffic accidents. Launched in 2007, See Me Safe is an educational program designed to reach families and the medical community. The program acknowledges the important role that health care providers play in educating parents about child passenger safety. Toward that end, See Me Safe is working to establish a supportive network of physicians, nurses, medical interns and pediatric trauma response teams, through which parents can learn about the proper use of safety restraints for their children. See Me Safe has distributed 750 car seats and reached 125 health care providers through its Prescription for Safety workshop. In 2009, See Me Safe will partner with organizations in Nashville, Tenn., San Antonio, Tex., and Phoenix, Ariz., on this initiative.

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Safer Vehicles

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 - Post-Crash/Injury Mitigation Technologies

Accident Avoidance Technologies

A variety of technologies, in addition to a vehicle's handling and braking capabilities, can help drivers avoid accidents. These technologies are generally not necessary for attentive drivers in most road conditions, but may provide added benefits for drivers who become distracted or experience challenging road conditions.

For example, Ford's new Rearview Camera with Guidelines can enhance rear visibility. It uses an exterior camera embedded in the rear of the vehicle that sends images to a video display in the rearview mirror or the navigation system screen. These images can help improve visibility directly behind the vehicle when the driver is in reverse. The camera image is overlaid with lines that mark the width of the vehicle, which makes it easier to gauge distance and navigate in reverse. The system increases visibility in low light by using a low-light-capable camera and high-intensity reverse tail lights. The system not only enhances reverse driving, it can also assist with actions that require reverse maneuverability, such as parallel parking and hitching trailers. This system will be offered on most of Ford's full-size pickups, vans and crossovers – including the new 2009 Ford F-150.

RELATED LINKS

- Vehicle Web Sites:
- Ford Taurus
 - Ford Flex
 - Ford Explorer
 - Ford SportTrac
 - Ford Expedition
 - Ford Escape
 - Ford Escape Hybrid
 - Ford F-150
 - Ford E-Series
 - Mercury Mountaineer
 - Mercury Mariner
 - Mercury Mariner Hybrid
 - Lincoln Navigator
 - Lincoln MKX
 - Lincoln MKS
 - Volvo XC70
 - Volvo V70
 - Volvo S80
 - Volvo XC60
 - Volvo XC90
 - Ford Mondeo
 - Ford S-MAX
 - Ford Galaxy

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2010 Ford Escape Rearview Camera with Guidelines

Ford is continuing its development of accident avoidance features that use forward-looking radar and vision sensors. These features are being developed to help warn drivers of potentially dangerous situations, such as unintended lane departures, pedestrians in the roadway or following a vehicle too closely. These technologies are being developed by a joint team in Dearborn, Michigan; Merkenich, Germany; and Gothenburg, Sweden. Some of these features are now available on selected Ford and Volvo vehicles.

Adaptive Cruise Control (ACC), for example, helps drivers maintain a safe distance from the vehicle in front of them. It is one of the innovations now available on the 2009 MY Lincoln MKS, as well as the Volvo XC60, S80, XC70 and V70, and the Ford Mondeo, S-MAX and Galaxy. While primarily a comfort and convenience feature, Adaptive Cruise Control also contributes to more controlled driving when traffic flow is uneven. The ACC module is mounted at the front of the vehicle and uses radar to measure the gap and closing speed to the vehicle ahead. The system automatically adjusts the speed

of the car to help maintain a pre-set distance from the vehicle in front. Ford was the first manufacturer to launch radar-based ACC several years ago.

On Volvo vehicles, Forward Collision Warning with Auto Brake comes as part of the ACC package and uses radar technology to help avoid or reduce the effects of rear-end collisions. The area in front of the car is monitored by a radar sensor. If the equipped vehicle approaches another moving vehicle from behind and the driver does not react, a visual and audible warning signal is activated. The system is designed to provide sufficient time for the driver to react and avoid or reduce the hazard. If the risk of collision increases despite the warning, Auto Brake is activated. This system supports driver-initiated braking by pre-charging the brakes and preparing for panic brake application, and then brakes automatically if a collision remains imminent. A similar system will be available on the 2010 Ford Taurus and Lincoln MKS.

The next generation of these preventative safety technologies was unveiled this year at the Detroit Auto Show on the Volvo S60 Concept vehicle. The S60 Concept featured Collision Warning with Full Auto Brake and pedestrian detection. This advanced radar- and camera-based technology reacts when a pedestrian walks in front of a car, and will activate the car's full braking power if the driver does not respond to the danger. The radar has a widened field of vision, which allows it to detect the moving pattern of a pedestrian. The automatic full braking power – a first in the industry – is an emergency measure that is designed to activate when a collision with a pedestrian or vehicle is imminent. The S60 Concept also included an upgraded Adaptive Cruise Control system that maintains a set time gap to the vehicle in front all the way down to a standstill (rather than to 30 km/h, as at present). These next-generation technologies will be introduced on the all-new Volvo S60 in 2010.

Driver Alert Control and Lane Departure Warning are two other forward-looking-radar-based features recently launched on the Volvo XC60, S80, V70 and XC70. These systems are designed to help address driver fatigue, which is a traffic safety concern worldwide. The Driver Alert Control and Lane Departure Warning features use a forward-looking camera to continuously monitor the road and keep track of where the car is in relation to the lane markings. The system is designed to sense if the driver loses concentration or the vehicle's wheels move outside the lane markings without an obvious reason, such as use of a turn signal. In that case the system provides a warning chime to alert the driver. This patented system has been tested both on roads and in simulators and is unique among vehicle manufacturers.

Volvo has also introduced a unique new and award-winning system called City Safety, which will help drivers avoid the sort of low-speed collisions that are common in slow-moving urban traffic. If a driver is about to collide with the vehicle in front and does not react in time, the City Safety system is designed to activate the brakes to slow the vehicle. City Safety is active at up to 30 km/h.

City Safety works via an optical laser system integrated behind the top of the front windscreen. It can monitor vehicles up to six meters from the front of the car. If the vehicle in front suddenly brakes and City Safety senses that a collision is imminent, it pre-charges the brakes to help the driver avoid an accident by braking or letting the driver steer away from a potential collision. The City Safety feature allows driver-initiated interactions (steering or braking) to override the City Safety system. Volvo introduced City Safety as standard equipment on the Volvo XC60 in late 2008.

Another important Ford safety innovation is the next generation of adaptive headlamps. With a unique two-part optics package, the Adaptive Front Lighting System (AFLS) is an industry breakthrough that allows drivers to see better at night around curves in the road. Most cornering, or swivel, lighting systems are one-piece modules that turn as a single unit with the vehicle as it approaches a curve. In contrast, the AFLS incorporates two independent light sources: a high-output halogen projector for the main beam and a secondary row of light-emitting diodes that illuminates almost instantaneously, distributes the light beam evenly and consumes less power than conventional lights. The system allows drivers to take corners and curves more safely, and to consume less energy while doing so. The AFLS was unveiled on a concept vehicle at the 2006 North American International Auto Show and is now available on a number of vehicles across the Ford fleet, both in North America and Europe.

Finally, Ford's industry-leading innovation known as Roll Stability Control® (RSC) continues to give drivers more confidence in emergency situations. Ford and its global brands have built more than four million vehicles globally with electronic stability control systems. To date, more than one million of those vehicles feature AdvanceTrac® with Roll Stability Control, which actively measures and helps control both yaw and roll movements. RSC uses two gyroscopic sensors to detect when a driver corners too fast or swerves sharply to avoid an obstacle. It then applies pressure to select brake(s) to help the driver maintain control and thus reduce the risk of a rollover event.

Roll Stability Control was first introduced on the 2003 Volvo XC90 and is now standard equipment on the Ford Flex, Explorer, SportTrac, Expedition, Edge, Escape and F-150, as well as E-Series Wagons equipped with the 5.4L engine. It is also standard equipment on the Mercury Mountaineer and Mariner, the Lincoln Navigator and MKX, and the Volvo XC60. Ford has developed a next-generation regenerative braking system for the 2009 Escape Hybrid and Mariner Hybrid that is compatible with RSC.

Percent of North American Nameplates with Standard Offering of Electronic

Stability Control or Roll Stability Control

	<i>Percent</i>
2010 Model Year	77%
2009 Model Year	62%
2008 Model Year	40%
2007 Model Year	27%

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Occupant Protection Technologies

Many factors influence a vehicle's crashworthiness, including the design of the vehicle's structure to absorb impact energy and the use of passive safety equipment such as air bags. To help protect drivers and passengers in the event of a crash, a variety of Ford technologies have been designed to enhance the performance of safety belts and air bags and provide additional occupant protection in side crashes and rollovers.



The Safety Canopy

Ford was the first in the industry to offer rollover-activated side-curtain air bags, known as the Safety Canopy®, beginning with the Ford Explorer and Mercury Mountaineer in 2002. Today, the Safety Canopy with rollover sensors – which helps reduce the risk of injury to vehicle occupants during side-impact collisions and rollover accidents – is available on most Ford vehicles, including the Ford Focus, Fusion, Taurus, Taurus X, Flex, Edge, Escape, Explorer, SportTrac, Expedition and F-Series; the Mercury Milan, Sable, Mariner and Mountaineer; and the Lincoln MKZ, MKS, MKX and Navigator. By the 2010 model year, all Ford, Lincoln and Mercury retail SUVs and crossovers, as well as vans and trucks under 8,500 lbs., are planned to have the Safety Canopy as standard equipment. Ford already has more than 1.5 million vehicles on the road with Safety Canopy rollover-activated curtains.

RELATED LINKS

Vehicle Web Sites:

- Ford Focus
- Ford Fusion
- Ford Taurus
- Ford Taurus X
- Ford Edge
- Ford Flex
- Ford Escape
- Ford Explorer
- Ford SportTrac
- Ford Expedition
- Ford F-150
- Mercury Sable
- Mercury Milan
- Mercury Mountaineer
- Mercury Mariner
- Lincoln MKZ
- Lincoln MKX
- Lincoln MKS
- Lincoln Navigator
- Volvo V70
- Volvo XC70
- Ford Mondeo
- Ford S-MAX
- Ford Galaxy

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SPACE™ Architecture

The 2009 Ford Taurus, Taurus X, Flex, Mercury Sable and Lincoln MKS have been engineered with crush zones designed to direct excess energy around the passenger compartment into a high-strength frame. This advanced engineering design – known as SPACE™ Architecture – utilizes crash form management techniques to help channel impact forces around and away from the passenger cabin.



Integrated two-stage booster seat, which helps to protect children who have outgrown their toddler seat

Another new technology – which launched on the 2008 Volvo V70 and XC70 and received numerous accolades – is the integrated two-stage booster seat, which helps to protect children who have outgrown their toddler seat. The system received *Popular Science's* annual Best of What's New award, as well as the World Traffic Safety Symposium's award for best new safety feature, presented at the 2007 New York International Auto Show.

With this system, a separate booster cushion is not required; instead, the base of the rear seats lifts up, placing the child in the correct position relative to the safety belt. The system includes two settings: the upper setting is designed for children measuring 95–120 cm and weighing 15–25 kg, while the lower setting is intended for children 115–140 cm in height and weighing 22–36 kg. When the integrated boosters are not raised, the seats are indistinguishable from rear seats without this option, and both fold flat to expand the cargo compartment.

In Europe, the Ford Mondeo, S-MAX and Galaxy are equipped with an Inflatable Knee Bolster, designed to help reduce the driver's forward motion in the event of a severe frontal crash and reduce the risk of injury to lower limbs. This technology is expected to be available on select Ford vehicles in the U.S. for the 2010 model year.

Safety belts remain the most important vehicle safety technology available. Responding to the changing demographics of today's driving population, Ford is researching advanced, next-generation safety belt technologies that could help to further reduce the number of annual vehicle fatalities, which are already at their lowest levels since 1994 in developed countries.

One new design under development, envisioned for possible use in rear seats, incorporates an air bag into the safety belt itself. In this design, a tube of air bag material is hidden in the safety belt webbing, and the tube inflates into a cylindrical shape when the frontal air bags deploy. The inflatable belts have the potential to spread the forces from a vehicle crash over a broader section of the body than a traditional safety belt, which may help to reduce pressure on the chest. At the same time, the bag may help to control the motion of the head and neck.

Research and evaluations have shown that the inflatable belt may effectively enhance the protection of occupants in the rear seat, including children and the elderly. When not inflated, the thicker belt was judged in consumer clinics to be more comfortable than a standard safety belt, because it felt like it was padded. A developmental version of the inflatable belt system was shown on a concept car at the Detroit Auto Show in January 2006.

Finally, as smaller and more fuel-efficient vehicles become more popular, the safety of smaller cars is sometimes raised as a concern. Ford's study of accident trends found that fatality rates for small cars of the 1990s were lower than for large cars of the 1970s, due to improvements in vehicle safety, changing driver behavior such as increased seat-belt usage and generally safer road infrastructure.

Ford's focus is to continue making small cars even safer while building larger vehicles that are more crash compatible with smaller vehicles. We've already lowered the front bumper structures on most of our crossovers, SUVs and pickups to help them better match up with small vehicle crash structures. We also are taking weight out of larger vehicles while helping to maintain their crashworthiness with advanced, high-strength yet lightweight material in crash structures. The all-new 2009 F-150 is a good example with use of boron – the strongest weldable metal – and other exotic materials in the crash structure that helped us achieve the segment's best crash-test ratings and unsurpassed fuel economy while maintaining the vehicle's weight even as we added more standard safety equipment.

Vehicle Safety

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Safer Vehicles

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Post-Crash/Injury Mitigation 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 enable a driver to summon assistance in an urgent situation either automatically (if, for example, an air bag deploys) or at the touch of a button.

In the U.S., Ford SYNC® is a new, award-winning, in-car connectivity system that was introduced on certain 2007 model year vehicles. Beginning with the 2009 model year, SYNC-equipped vehicles come with an all-new occupant communications capability called 911 Assist. In the event of a crash, the ability to directly contact the local 911 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 a local 911 emergency operator – when a phone is properly paired, turned on and connected to SYNC and where the system and cell phone remain powered and undamaged – should a crash with an air bag deployment or fuel shutoff switch activation occur. The key advantage of SYNC 911 Assist is speed, as calls are placed directly to local 911 operators and do not have to be routed through a call center (as in competitors' versions), which can delay the time it takes to get help on the way. SYNC 911 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.

This voice-activated feature will be available to customers with 2008 model year SYNC-equipped vehicles through a dealer-installed software update. SYNC's 911 Assist will be launched progressively in Ford's European product range beginning in 2010.

In late 2004, Ford, via its membership in the European Automobile Manufacturers' Association, signed a memorandum of understanding (MOU) regarding the development of a pan-European, in-vehicle emergency call system dubbed "eCall." The purpose of the MOU is to promote the development and implementation of eCall systems throughout Europe, in order to improve the number of vehicles reached by emergency responders within a short period of time.

The On Call system – a GSM- and GPS-based emergency and assistance system¹ – is currently available on Volvo vehicles. It is sold and operational in 13 European countries, including Russia, and is working across borders in an additional two European countries. With the On Call system Ford has made and will continue to make significant progress toward increasing the availability of eCall technology on vehicles in Europe.

The SOS-Post Crash Alert System, newly released as standard equipment on Ford's 2009 Taurus, is another important advance in post-crash safety technology. The SOS-Post Crash Alert System automatically activates the horn and emergency flashers (and the second-generation system automatically unlocks vehicle doors) in the event of an air bag deployment or safety belt pretensioner activation. The system is designed to alert passersby and emergency services to the vehicle's location.

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In This Report:

[Driver Distraction](#)

Vehicle Web Sites:

[Ford Taurus](#)

External Web Sites:

[European Automobile Manufacturers' Association](#)



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1. GSM = Global System for Mobile communications; GPS = Global Positioning System

Driving Environment

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Safer Roadways

The driving environment includes physical infrastructure (roads, signs, traffic lights, etc.) and the condition and maintenance of that infrastructure. Increasingly, information technologies play a role in the driving environment – for example, by controlling the timing of traffic lights. All of these factors have a significant influence on traffic safety.

Safety challenges related to the driving environment vary between countries and between developed and developing economies. Around the world, we work with government agencies and private-sector partners to promote road safety.

In Europe, Ford has been taking a leadership role in two major accident research activities, in cooperation with public bodies. These activities are the German In-Depth Accident Study (GIDAS) and the United Kingdom's Co-operative Crash Injury Study (CCIS). GIDAS is a statistically representative, "on-the-spot" study that allows for the analysis of pre-crash factors and pedestrian impacts. The CCIS is a retrospective, statistically stratified study with a particular focus on seriously injured occupants. Both studies are jointly funded by government and industry, demonstrating a partnership approach to understanding real-world safety issues. Ford sees these two different but complementary studies as key components of its policy of data-driven decision making, both internally to ensure that our safety strategy is targeted at the most productive areas, and externally to help governments focus their rulemaking attention on genuine safety issues, where they can make a difference.

In late 2004, working in partnership with General Motors, Honda, Michelin, Renault, Shell and Toyota, Ford helped to found the Global Road Safety Initiative (GRSI). The purpose of the GRSI is to transfer best practices, with the objective of reducing accidents and building capacity in developing countries to manage road safety. Projects include educational outreach to increase safety belt and helmet usage rates, and training aimed at improving roadway design.

Ford and other participating companies have pledged a total of \$10 million to the GRSI over five years to fund important road safety projects in China, Brazil and countries in the Association of Southeast Asian Nations. The projects are being implemented through the Global Road Safety Partnership, an existing organization founded by the World Bank and national governmental aid organizations. Ford serves on the Partnership's Executive Committee and is actively involved in project execution. The projects rely on delivery through local organizations, so those organizations can build capacity and continue their work long after the projects are completed.

Also in China, Ford is cooperating with the China Automotive Technology & Research Center (CATARC) and the Chinese Ministry of Public Security to launch a new project that aims to provide accurate and scientific data for research into road safety in China. As part of that project, Ford took part in a workshop in Shanghai in January 2007 that brought together road safety experts from the United States, Europe and China to exchange information and experience, as well as to define a road safety project that will help establish a "glide path" for rapidly reaching an accident reduction target.

In addition, Volvo Car Corporation, the Volvo Group and CATARC have launched a project on traffic accident research in China to analyze accident statistics. The aim is to assist decision makers in prioritizing among traffic safety activities.

In Australia, the Australian National Crash In-depth Study (ANCIS), of which Ford is a founding member, is an unprecedented collaboration among major Australian vehicle manufacturers, federal and state governments, insurance companies and automobile clubs. Established in 1999 and managed by the Monash University Accident Research Centre, ANCIS provides a means for collecting detailed information about representative automobile crashes in Australia, to examine crash and injury trends and monitor emerging problems. The study's objectives have recently been expanded from a focus on vehicle crashworthiness to include crash involvement factors such as infrastructure and driver behavior.

RELATED LINKS

External Web Sites:

- [German In-Depth Accident Study](#)
- [Co-operative Crash Injury Study](#)
- [Global Road Safety Initiative](#)
- [Global Road Safety Partnership](#)
- [China Automotive Technology & Research Center](#)
- [Australian National Crash In-depth Study](#)

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The unique arrangement of stakeholders involved in ANCIS has resulted in a much greater understanding among all parties of the systemic nature of road crashes. Ford continued to support ANCIS during 2008.

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Active Safety Research

Ford is undertaking a number of research efforts to assess and verify the effectiveness of new active safety technologies, such as those using forward-looking radar and vision sensors. For example, Ford, Volvo and the National Highway Traffic Safety Administration are jointly conducting a two-year study – the Advanced Crash Avoidance Technologies study – to develop methodologies for measuring and evaluating these technologies. This study will conclude in 2009.

One particularly creative research technique Ford has been using involves driving cars with Forward Collision Warning with Brake Support into large "balloons" nearly the size and shape of real cars. The purpose of these tests is to assess the accuracy of the radar and the timing of the warning signals and braking pre-charge. The balloons play the role of a "target" vehicle, allowing Ford engineers to assess the radar and braking features without endangering test drivers or damaging real cars. The balloons offer enough "give" to allow impact without injury. Ford uses about a dozen balloon cars in different sizes, each made from tarp-like material and weighing more than 40 pounds.



Ford testing new active crash-avoidance technologies

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Servo Sled

In the fall of 2005, Ford commissioned the Servo-Hydraulic Reverse Crash Simulator, known as the Servo sled. This state-of-the-art system is reducing the time and resources required for Ford to research, design and build a new car or truck. Located inside Ford's Safety Innovation Lab in Dearborn, the Servo sled is the most capable crash simulator of its type in the world.

The Servo sled builds on the basic principle of the Hyge sled, a crash test simulator Ford has used for more than 40 years. The Hyge and Servo sleds each sit inside a corridor about the width of a two-lane highway and about 50 yards long. A track runs the length of the corridor with the sled on top of it. On top of the sled sits a "buck" – an accurate representation of the interior of the vehicle to be tested (including seats, instrument panel, windshield, airbags, seat belts, etc.). Crash test dummies are positioned in the buck.

To launch a test, the buck and sled are propelled to more than 35 mph in a few milliseconds. The sled and buck can be used again, but the seats, seat belts, airbags and so forth must be replaced before another test can be performed.

The Servo sled is a significant improvement over the Hyge, for several reasons. Most important, it more accurately represents a vehicle's "pulse," or the acceleration experienced in the occupant compartment during a full vehicle crash test. This reduces the number of full crash tests that must be conducted. The Servo sled can also simulate vehicle pitching and side-impact events, which the Hyge cannot. In short, the new Servo sled allows more representative testing in a given time period, with fewer resources than previously, and enables Ford to more quickly bring safety features to market.





Servo-Hydraulic Reverse Crash Simulator, known as the Servo sled

Collaborative Efforts

Ford Motor Company is involved with a number of partners to enhance the safety of the driving experience and develop future technologies.

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- European Field Operational Test
- U.S. Department of Transportation
- Advanced Emergency Communications Coalition
- National Highway Traffic Safety Administration
- Alliance of Automobile Manufacturers
- Society of Automotive Engineers
- U.S. Council for Automotive Research
- Global Human Body Modeling Consortium

European Field Operational Test on Active Safety Systems



One of the biggest issues regarding advanced safety systems is real-world user behavior. In 2008, to gain greater insight on this topic, Ford launched a major European research project to deliver a large-scale field operational test on active safety systems. Under the EU's Seventh Framework Program (FP7) for research and technological development, this project joins together 28 partners – including vehicle manufacturers, suppliers, universities and research centers – and will run for three years. More than 1,500 cars and trucks will be equipped with a range of new active safety technologies, along with advanced data collection capabilities. This will allow a thorough evaluation of the new technologies, in real-world scenarios and with ordinary drivers. The project is led by the Ford research center in Aachen, Germany, and includes 100 Ford and 100 Volvo vehicles.

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CAMP

In 1995, Ford and General Motors launched the Crash Avoidance Metrics Partnership (CAMP) to conduct pre-competitive active safety research with other OEMs, suppliers and the U.S. government. Within CAMP, the Vehicle Safety Communications Two (VSC-2) Consortium, which includes Ford, GM, Toyota, DaimlerChrysler and Honda, is working with the U.S. Department of Transportation on two major projects to develop safety applications that utilize vehicle communications. Their efforts are focused on developing a communication system whereby vehicles can "talk" to each other and to the roadway. This would be analogous to a wireless internet system or a cellular telephone for cars. CAMP VSC-2 successfully completed a project that demonstrated the basic feasibility of this technology, and is evaluating the following applications in a follow-on project:

- **Cooperative Intersection Collision Avoidance System: Violation Warning**
As a vehicle approaches a traffic light, it would receive a message from the traffic light with the signal phase (red, yellow or green) and the amount of time until the signal changes. The vehicle would use this information, together with the vehicle position and speed, to decide if a warning or some other countermeasure (such as brake assist) is appropriate. The systems engineering and system design were completed, and a prototype vehicle was developed. This prototype was used to successfully complete a pilot field operational test of the system.
- **Vehicle-to-Vehicle Communications for Safety Applications, such as Electronic Emergency Brake Lights (EEBL)**
The vehicle manufacturers in the VSC-2 are working together with the National Highway Traffic Safety Administration to investigate the messages needed for a host of vehicle-to-vehicle safety applications, including EEBL. For example, when a driver applies the brakes, the brake lights are illuminated, but there is currently no way to distinguish hard braking from light or moderate braking. Further, often only the vehicle directly behind the braking vehicle is able to see the brake lights. If a vehicle performing hard braking could send a message to other vehicles, then those vehicles could warn their drivers, activate brake assist or even start automatic braking. Other applications that evolved out of the work on wireless vehicle-to-vehicle technology include active safety systems such as forward collision warning technologies and lane-keeping systems.

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CAMP consortia are also conducting two additional projects with NHTSA. The Crash Imminent Braking Project (involving Ford, GM, Mercedes, Continental and Delphi) is developing minimum performance requirements and objective test procedures for systems that automatically apply the brakes to avoid crashes or mitigate the severity of a crash. The Advanced Restraint Systems Project (involving Ford, GM and Mercedes) is developing restraint systems that utilize pre-crash and occupant sensing information.

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The Advanced Emergency Communications Coalition

For the past 10 years, the ComCARE Emergency Response Alliance has served as an important public voice for improving emergency communications. ComCARE encouraged the establishment of wireless communication networks, infrastructure and technologies that enable emergency communications between the motoring public and public safety agencies. Ford has participated on the Board of Directors of ComCARE for most of the past decade and helped to write the Vehicle Emergency Data Set standard proposed by ComCARE in 2002. Late last year, the ComCARE Board voted to reorganize and establish a new organization to continue ComCARE's advocacy. The name selected for the new organization is the Advanced Emergency Communications Coalition, with the mission "to advocate for the adoption and improvement of advanced emergency communications technologies."

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University Partnerships

Ford Motor Company is increasingly collaborating with university partners on crucial advanced safety technology projects. Ford has major research alliances with the Massachusetts Institute of Technology (MIT), the University of Michigan and Northwestern University and has utilized Ford's global University Research Program (URP) to collaborate with leading researchers at more than 100 universities worldwide. Safety is a central thrust in our collaborative university programs.

Important projects are underway within the Ford–MIT alliance, yielding progress in areas of vehicle autonomy and "active safety" – that is, technology to prevent accidents from occurring, including computer vision, lane keeping, vehicle controls, obstacle detection and avoidance, and accurately assessing the driver's interaction with the vehicle. At the University of Michigan, safety work includes a portfolio of projects on 360° sensing and developing more robust and capable active vehicle control and enhanced collision avoidance systems, utilizing both onboard sensors and offboard information sources.

Ford has an ongoing URP project at Virginia Tech assessing the properties of maternal tissues from pregnant women. This project will enable the improvement of computer models to help gain a better understanding of the injury risk to pregnant women and their unborn babies. Another project at the State University of New York's Downstate Medical Center should yield an improved understanding of human tolerance to pelvis injury, and collaborative work is ongoing with Purdue University investigating enhanced vehicle dynamics and stability control.

As part of its accident research projects in Germany, the UK and Australia, Ford works closely with internationally acknowledged safety experts from the Universities of Hannover, Loughborough, Dresden, Birmingham and Monash.

Collaborative university work catalyzes innovation at Ford by providing access to the leading researchers at the cutting edge of vehicle dynamics and stability control, accident avoidance and driver assist safety technology to name just a few. Ford will continue to integrate these collaborative innovations, driving continuous improvement in real-world safety and sustainability for all Ford Motor Company products.

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Alcolock Blue Ribbon Panel

Reducing the incidence of impaired driving would go a long way toward improving road traffic safety. In the EU, 25–30 percent of all car accidents involve alcohol. In the U.S., approximately 40 percent of all traffic fatalities are alcohol-related (as defined by NHTSA).

The Automotive Coalition for Traffic Safety formed a Blue Ribbon Panel (BRP) in 2007 for the development of advanced alcohol detection technology, often called "alcolocks." The panel consists of vehicle manufacturers, including Ford, alcohol detection technology suppliers, Mothers Against Drunk Driving, the Insurance Institute for Highway Safety, government representatives and other experts.

The BRP and its research is being funded jointly by NHTSA and the Alliance of Automobile Manufacturers. The purpose of the research is to "...engage major automakers in cooperative research

that advances the state of alcohol detection technology...to promote the standardization of the technology, its widespread deployment, and acceptance by the general public."

Ford continued to participate in the work of the Blue Ribbon Panel through the Alliance during 2008.

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New Crash-Test Dummies

Crash-test dummies are essential research tools that aid in the development of passive safety technologies, and Ford Motor Company continues to develop, often in partnership with other parties, more advanced test dummies.

From 2005 through 2008, Ford partnered with the Children's Hospital of Philadelphia (CHOP), the University of Virginia, Virginia Tech and the Takata Corporation in a multi-year project to develop a new abdominal insert and sensor for a crash-test dummy representing a six-year-old child. CHOP studies have shown that, in vehicle crashes, significant abdominal injury in four- to eight-year-old children is second in frequency of occurrence only to head and facial injuries. Abdominal injuries often occur when children too young (i.e., the four- to eight-year-old range) utilize adult restraint systems without a booster seat. The abdominal insert and sensor will allow restraint engineers industry-wide to test the potential for abdominal injuries in children and ultimately improve the development of in-vehicle restraint systems for young children. In February 2008, the Society of Automotive Engineers established a task force to perform "round robin" testing of the new dummy component, and the group held its first meeting in June. More than 20 organizations from around the globe have signed up to participate. Tests will be performed by dummy manufacturers, other OEMs and NHTSA's Vehicle Research and Test Center.

In another effort, Ford, GM and DaimlerChrysler have been working together under the auspices of the Occupant Safety Research Partnership (OSRP), a group within the U.S. Council for Automotive Research, to research, develop, test and evaluate advanced crash-test dummies and other pre-competitive safety systems. A number of years ago, the OSRP initiated development of WorldSID, a male side-impact dummy that is recognized as the most advanced crash-test dummy ever created. From 2006 through 2008, the OSRP worked with NHTSA to help them evaluate WorldSID for potential use in the federal government's new side-impact crash-test standard. NHTSA concluded that the "biofidelity" of WorldSID is better than that of the dummy in the current side-impact regulation. WorldSID is the first side-impact dummy with the potential to be commonly used in side-impact regulations around the world.


Ford is also involved in the Global Human Body Modeling Consortium (GHBMC), which holds promise for the future of safety research. Established in 2006 by nine automotive manufacturers (including Ford) and two automotive suppliers, the GHBMC is working to develop next-generation, computer-generated virtual reality models of the human body. These advanced models will help researchers to better predict the effect of trauma resulting from automobile crashes on the human body and enable a variety of virtual crash tests, with the ultimate goal of improving automotive safety globally. The research and development is currently being led by multidisciplinary teams at universities in five countries – the U.S., Canada, France, India and Korea – with the first set of human digital models expected to be completed in 2011. Ford brings much expertise to this effort, having developed its own human body model representing an average-sized male occupant and publishing this work in peer-reviewed journals over the last 15 years. Ford continues to refine its human body model for use in internal research.


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The data relating to vehicle safety is included in the Society section of this report. [Please click here to see the data.](#)

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[Driver Distraction](#)


Learn about the latest research on driver distraction, and how Ford has taken steps to enhance driving safety for those who use cell phones and other telematics devices while driving.

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[Driving Skills for Life: Asia Pacific Expansion](#)

Read about the 2008 launch of Ford's highly successful Driving Skills for Life program in the Philippines, Vietnam, Thailand and Indonesia.

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Over the past two decades, cellular phones have gone from clunky novelties to ubiquitous must-haves. Wireless subscriptions in the United States have grown from about 28 million in 1995 to about 270 million in early 2009 – a whopping 960 percent increase. The public has become accustomed to using cell phones 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.

The ubiquity of cell phones – coupled with the more recent proliferation of portable music players in vehicles – has heightened concerns about driver distraction. We at Ford agree 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.





Ford Focus with SYNC®, Ford's fully integrated, voice-activated in-car communications and entertainment system

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Human Behavior

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[National Safety Council](#)
[University of Michigan Transportation Research Institute](#)
[Insurance Institute for Highway Safety](#)
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Recently, the National Safety Council (NSC) called for a total ban on the use of cell phones, both hand-held and hands-free, while driving. The NSC stated that cell phone use while driving is "...a very high-risk behavior with significant impact on crashes...." And indeed, some studies have concluded that 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 completed by the University of Michigan Transportation Research Institute are beginning to reveal that, when immersed in real traffic conditions, drivers using cell phones by and large exhibit prudent driving behavior.

In addition, recent results from the landmark Virginia Tech 100-Car Naturalistic Driving Study found that visual distraction, not cognitive distraction, is the main safety concern in the real world. This large-scale study reported that almost 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. In 2008, the study's authors 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 clearly 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.

It is also interesting to note that, despite the significant increase in cell phone use in recent years, crash

rates have fallen over the same time period (specifically, in both the categories of "fatal crashes" and "police-reported crashes"). Also, the Insurance Institute for Highway Safety has published studies indicating that hand-held phone bans in New York, Washington, DC, and Finland led to an initial decline in the banned behavior followed by a return to pre-ban levels of hand-held phone use within roughly one year.

For several years now, Ford has been focused on this issue of driver distraction and taken steps to enhance driving safety for those who use cell phones and other telematics devices while driving. Through its work with the Alliance of Automobile Manufacturers, for example, Ford helped lead the development of an industry-wide Driver Distraction Voluntary Agreement, and Ford designs its telematics systems to meet that agreement.



In addition, Ford designed and introduced SYNC®, our voice-activated in-car connectivity system, which has been shown to significantly enhance the ability of drivers to attend to the driving task while using cell phones and music players. Recently completed simulator research at Ford has shown 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. (See the above video for an example. It shows how long it takes a driver to find a song on an MP3 player manually vs. using SYNC's voice-activated system.) This study evaluated driver performance, not driver behavior in the real world. However, these performance effects are consistent with the 100-Car study results and strongly suggest that SYNC will improve highway safety overall.

Ford recognizes that drivers will in fact use cell phones and music players while driving, and that evolving technologies like text messaging are growing increasingly popular. Text messaging is a particular concern, as it requires significant time looking away from the roadway to operate. 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, and then provides a list of canned replies for the driver to select rather than key-in or compose manually.

We believe that further 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.

Driving Skills for Life: Asia Pacific Expansion

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In the developing countries of Southeast Asia, traffic safety is a critical and growing concern. Indonesia alone recorded 24 million road traffic accidents in 2007, for example, resulting in nearly 37,000 deaths and more than 2.5 million injuries. The causes behind these terrible statistics are many, and include poorly maintained roads, inadequate infrastructure and the vast number of pedestrians, bicycles and motor scooters that often share roadways with cars and trucks.



Driving Skills for Life

The solutions to this complex issue will also need to be wide-ranging. Among them, however, is better driver education, and that's where Ford has recently stepped up its role.

This past year, Ford's Asia Pacific and Africa region implemented the Company's highly successful Driving Skills for Life (DSFL) driver education program in the Philippines, Vietnam, Thailand and Indonesia. The DSFL program was customized to address the higher average age of beginning drivers in the region, as well as the unique driving environments within each market.

"This is a huge step in the right direction," said Greig Craft, president of the Asia Injury Prevention Foundation (AIPF). "In developing countries, motorization is happening so quickly that road traffic injuries and deaths have reached an epidemic proportion. People are taking to the road in ever-greater numbers, usually without the training to drive properly or the fundamental understanding of driving skills. Driver training, education and public awareness are imperative to making a difference. That's what Driving Skills for Life is all about."

To help bolster DSFL's visibility and credibility to the relevant audiences, Ford is partnering with the AIPF to implement the program. The AIPF is highly regarded for its work with governments to improve road safety in developing markets. In each country, Ford has also secured the endorsement and support of relevant third-party organizations.

Ford launched DSFL in Asia with a "train-the-trainers" workshop in Bangkok, Thailand, in March 2008, at which Ford professionals from Germany trained two to three representatives from each of the four markets. A press conference and drive training for the media were held in each country to launch the program, followed by a series of events in each market for selected groups and members of the general public that included both classroom instruction and drive training sessions.

To date, more than 5,000 people have participated in the training sessions, including nearly 700 in Vietnam, over 1,000 in Thailand and more than 500 in Indonesia. The Philippines accounts for the remainder. Ford Philippines already had a UN-recognized and award-winning road safety program in place called R.I.D.E., or Responsibility in Driver Education, which conducts training sessions in schools and communities. In 2008, Ford Philippines integrated DSFL concepts into 28 R.I.D.E. sessions in 18 schools, reaching 3,000 students. In 2009, Ford Philippines will re-brand and re-launch its road safety programs under the DSFL name, to provide local market clarity and fully align with the regional DSFL program.

The Asia DSFL program covers both safe driving and "eco-driving." The safe driving portion focuses on the use of safety belts, recognizing and anticipating changing traffic conditions, avoiding distraction and maintaining a safe distance from other vehicles in traffic. The eco-driving training includes

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anticipating road conditions, applying fuel-efficient driving techniques, avoiding speeding and keeping a vehicle properly maintained for optimal fuel economy.

The DSFL program aims to involve Ford dealers in each market, helping to raise their profile as responsible businesses that actively contribute to the community. Dealer participation also helps significantly with logistics, as they are able to supply vehicles for the training and often a venue for driving instruction.

In 2009, Ford plans to continue building on the momentum of the DSFL campaign in its Asian markets, with the official launch of programs in China, Taiwan and India. Sessions will continue in the Philippines, Indonesia and Vietnam and Thailand. The 2009 program will also include an online presence which will be directly linked to the U.S. DSFL site. This will significantly extend the reach of the program within each Asian market by allowing an infinite number of people to participate online in local languages.

A grant from the Ford Motor Company Fund and Community Services' Ford GlobalGiving Campaign helped launch the Driving Skills for Life program in Southeast Asia last year, and additional funding will help support the expansion into the three new markets in 2009. This is the first Asian initiative supported by the Fund.

"It is great to see Ford, a leader in safety, doing something about this critical issue," said the AIPF's Craft. "We believe [DSFL] will be the catalyst for further action to improve road safety as nations across this region deal with rapid changes on their roads."