

Status Report

An aerial photograph of two cars on a road. In the foreground, a bright red car is moving away from the viewer. In the background, a black car is moving towards the viewer. The road has white lane markings.

Insurance Institute for Highway Safety | Highway Loss Data Institute

Stopping power

IHS rates 19 new models for front crash prevention

**ALSO IN
THIS ISSUE**
Vol. 50, No. 7
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- ▶ Evidence mounts in favor of front crash prevention
- ▶ Autobrake is reducing crashes abroad

While the prospect of fleets of driverless cars grabs headlines, vehicles that can brake without driver intervention if a crash is imminent are here and are making a measurable difference on U.S. roads. To help consumers zero in on automatic braking systems with the most stopping power, the Institute started rating passenger vehicles for front crash prevention in 2013.

More than a dozen new models earn the highest rating of superior in the latest round of IIHS ratings.

This is the third time the Institute has released ratings for front crash prevention systems (see *Status Report*, May 29, 2014, and Sept. 27, 2013, at iihs.org). The Institute rates vehicles as basic, advanced or superior for front crash prevention depending on whether they offer autobrake and, if so, how effective it is in tests at 12 and 25 mph (see iihs.org/ratings).

“Most motorists won’t be riding in driverless cars anytime soon,” says David Zubry, the Institute’s executive vice president and chief research officer. “In the shorter term, automatic braking is an accessible technology that’s within reach for many drivers. We’ve seen an uptick in the number of luxury and mainstream models with available autobrake. That’s a welcome sign for highway safety and helps pave the way for the eventual deployment of fully autonomous vehicles.”

Fourteen new models earn a superior rating and five earn an advanced rating. Earning superior are the 2016 Acura ILX, MDX, RDX and RLX; 2016 BMW X3; 2015 Chrysler 300 and its twin, the 2015 Dodge Charger; 2015 Mercedes-Benz C-Class (both Collision Prevention Assist Plus and Pre-Safe Brake equipped versions), CLA (both Collision Prevention Assist Plus and Distronic Plus equipped versions) and E-Class; and the 2016 Mazda 6 and CX-5. The 2016 Volkswagen Golf, Golf SportWagen, Jetta and 2015 Volkswagen Touareg are rated advanced for front crash prevention. The



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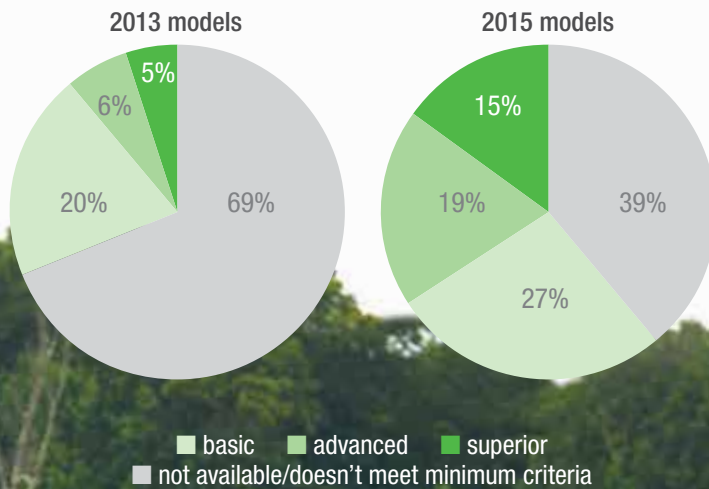


X3 earns an advanced rating when equipped with BMW's camera-only system called City Braking Function and is rated superior when equipped with a camera- and radar-based system.

Forward collision warning systems that meet performance criteria set by the National Highway Traffic Safety Administration and autobrake systems that provide only minimal speed reduction in IIHS tests earn a basic rating.

Vehicles that combine the warning with moderate speed reductions earn an advanced rating. It also is possible to qualify for an advanced rating with an autobrake system that doesn't first warn the driver before taking action. Models that provide major speed reductions in IIHS tests earn a superior rating.

Percentage of vehicles earning a superior, advanced or basic rating



Front crash prevention ratings

SUPERIOR

- Acura MDX / RLX (2016; Collision Mitigation Braking System)
- BMW X3 (2016; Collision Warning with Braking Function)
- Mazda CX-5 (2016; Smart City Brake Support and Smart Brake Support)
- Mercedes-Benz C-Class / E-Class rating previously released (2015; Collision Prevention Assist Plus and Pre-Safe Brake)
- Mercedes-Benz CLA (2015; Collision Prevention Assist Plus and DISTRONIC Plus)
- Acura ILX / RDX (2016; Collision Mitigation Braking System)
- Chrysler 300 (2015; Full Speed Forward Collision Warning with Crash Mitigation)
- Dodge Charger (2015; Full Speed Forward Collision Warning with Crash Mitigation)
- Mazda 6 (2016; Smart City Brake Support and Smart Brake Support)
- Mercedes-Benz C-Class / CLA / E-Class (2015; Collision Prevention Assist Plus)

ADVANCED

- BMW X3 (2016; Collision Warning with City Braking Function)
- Volkswagen Golf (2016) / Golf SportWagen (2016) / Touareg (2015) Front Assist with Autonomous Braking
- Volkswagen Jetta (2016; Front Assist with Autonomous Braking)

Models are ranked by points awarded in IIHS autobrake tests. For details on individual vehicles, go to iihs.org





The rating system is based on HLDI research indicating that forward collision warning and automatic braking systems help drivers avoid front-to-rear crashes (see *Status Report* special issue: crash avoidance, July 3, 2012).

Front crash prevention systems use various types of sensors, such as cameras, radar or laser, to detect when the vehicle is getting too close to one in front of it. Most systems issue a warning and precharge the brakes to maximize their effect if the driver responds by braking. Many systems automatically brake the vehicle if the driver doesn't respond. In some cases, automatic braking is activated without a warning.

Mercedes-Benz is first to offer a standard front crash prevention system that earns a superior rating in IIHS test track evaluations. Mercedes' Collision Prevention Assist Plus system is standard on the 2015 C-Class, CLA and E-Class. Most front crash prevention systems must be purchased as part of an optional package.

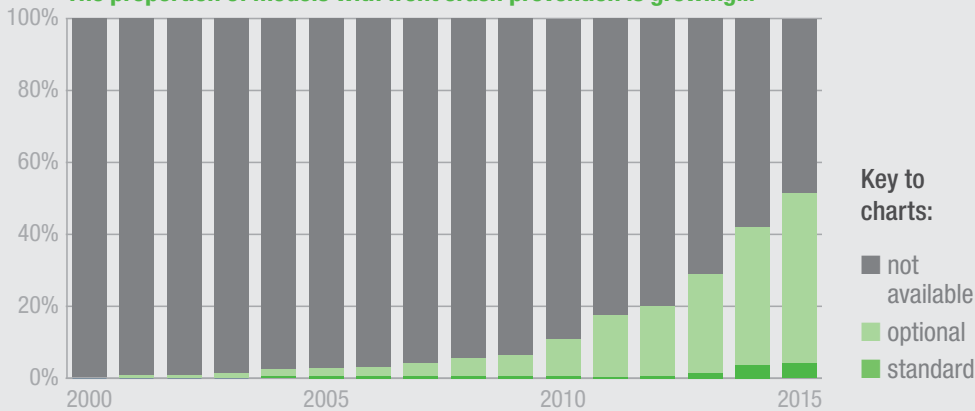
Since the Institute launched its front crash prevention ratings program in 2013, some manufacturers have upgraded autobrake capabilities to earn higher ratings. Mazda is one example. The 2014-15 Mazda 6 is rated advanced, while the 2016 midsize car earns a superior rating. Another is BMW. The 2013-14 X3 midsize luxury SUVs were rated basic. Now the 2016 model earns either an advanced or superior rating, depending on system options. Likewise, the 2015 Volkswagen Golf, Golf SportWagen and Jetta were rated basic for front crash prevention, while the 2016 models are rated advanced.

Although luxury vehicles are more likely to have optional front crash prevention systems, the technology is catching on with more mainstream nameplates. Seven of the 19 superior- or advanced-rated models in this new round are moderately priced: Chrysler 300; Dodge Charger; Mazda 6 and CX-5; and Volkswagen Golf, Golf SportWagen and Jetta.

Forward collision warning is available on half of the 784 2015 models in HLDI's vehicle features database. Twenty-seven percent of 2015 models offer a front crash prevention system with autobrake, more than twice as many as in the 2012 model year.

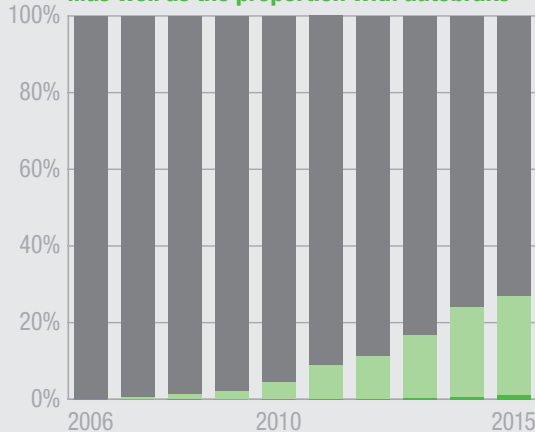
The Institute requires an advanced or better rating for front crash prevention as one of the criteria needed for a 2015 *TOP SAFETY PICK+* award. ■

The proportion of models with front crash prevention is growing...



Autobrake availability is on the rise, HLDI data show. Among 2015 models, 212 of 784 offer autobrake, more than twice as many as in the 2012 model year.

...as well as the proportion with autobrake





Evidence continues to mount in favor of front crash prevention

Subaru Legacy

Insurance data for vehicles with front crash prevention continue to pile up, making the trends ever more clear. Vehicles equipped with these systems consistently show lower rates of claims for damage to other vehicles and for injuries to people in other vehicles.

The latest reports from HLDI on front crash prevention also document reductions in damage to equipped vehicles and injuries to their occupants. However, those benefits vary among the systems from Honda, Volvo and Subaru, though it's not clear why.

HLDI first reported on reductions in claim rates for Volvo's low-speed autobrake system, City Safety, in 2011 and began noting benefits for higher-speed systems in 2012 (see *Status Report*, July 19, 2011, and July 3, 2012, at ihs.org).

As more and more vehicles on the road are equipped with the systems — some of which warn of impending crashes, some of which brake automatically, and some of which do both — patterns have emerged more clearly. In total, HLDI has studied nine different front crash prevention systems from five manufacturers.

“The specific benefits vary somewhat by system, but our latest analyses all show large reductions in property damage and

bodily injury liability claim rates,” says HLDI Vice President Matt Moore.

Property damage liability coverage pays for damage to other vehicles, and bodily injury liability pays for injuries to people in other vehicles or other road users.

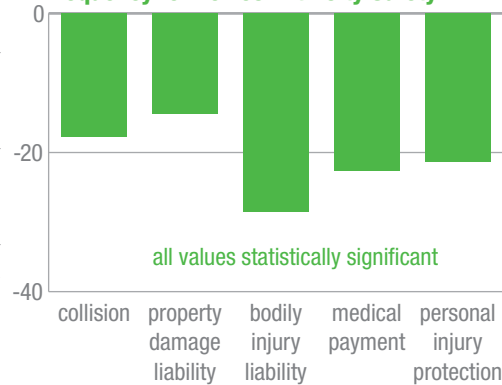
“Interestingly, the reductions in bodily injury claims are about twice the size of the property damage claim reductions,” Moore adds. “A large number of bodily injury claims are for whiplash injuries that occur when your vehicle strikes another from behind. That's the main type of crash that current front crash prevention systems are designed to avoid.”

Volvo City Safety

City Safety is meant to reduce the low-speed front-to-rear crashes that commonly occur in urban traffic. The earliest versions of the system operate at speeds up to 19 mph and rely on an infrared laser sensor built into the windshield. If it detects an impending crash, it automatically brakes the vehicle.

HLDI analysts previously studied the effect of standard City Safety on the Volvo XC60 by comparing that vehicle's claim rates with other midsize luxury SUVs. They also studied City Safety on the Volvo S60 by comparing it to other midsize luxury cars.

Percent differences in claim frequency for Volvos with City Safety



In the latest report, HLDI calculated combined results for both vehicles to come up with an overall effect for City Safety. They found that City Safety reduced claim frequency under all coverages 15-29 percent. All results were significant.

HLDI also took a separate look at how the City Safety benefit holds up as vehicles age. Comparing vehicles ranging from new to 5 years old, there was no pattern of diminished benefits over time.

Beginning with 2014 models, City Safety was changed to operate at speeds of up to about 30 mph. The new version isn't included in the HLDI studies. »

Autobrake is preventing crashes in Australia, Europe

Cars and SUVs equipped with automatic braking systems intended to prevent or mitigate certain low-speed crashes were involved in 38 percent fewer rear-end injury crashes in Australia and Europe than comparable models without the technology, a new meta-analysis by the Australian New Car Assessment Program (ANCAP) and European New Car Assessment Programme (Euro NCAP) indicates.

Researchers examined the real-world experience of passenger vehicles equipped with autobrake systems designed to operate at speeds up to 30 kph (19 mph). The study looked at two-vehicle injury crashes in which a case vehicle struck the rear of another vehicle or the case vehicle itself was struck in the rear. The analysis compared the ratio of these crash types for autobrake vehicles and similar vehicles without autobrake. Data were from Australia and five European countries and included 2009 and later police-reported crashes.

The majority of the case study vehicles were 2008-12 Volvos (S60, S80, V40, V60, V70, XC60, XC70) with City Safety, a low-speed front crash prevention system standard

on Volvos since the 2008 model year. Some autobrake models from Volkswagen (CC, Up) and Mazda (6, CX-5) also were included.

A separate analysis by Swedish insurer Volvia/If found that the overall claim frequency of front-to-rear collisions was 28 percent lower for Volvos with the first or second generation of City Safety with autobrake capabilities up to 19 or 30 mph compared with Volvos without the feature. The study included data from claims filed for crashes in Sweden between July 1, 2012, and June 30, 2014, involving 2010 and later models.

The findings of both studies are in line with HLDI analyses indicating that City Safety is reducing insurance losses (*see story p. 5*).

The ANCAP/Euro NCAP researchers note that an unintended consequence of improved braking could be that vehicles with autobrake are more often struck in the rear. This might result in an overestimation of the autobrake vehicle's ability to avoid striking the rear of another vehicle.

Research by HLDI, however, indicates that vehicles with autobrake aren't more likely than other vehicles to be hit from behind. Analysts examined the point of impact for



Courtesy of the European New Car Assessment Programme

Euro NCAP includes autobrake as a factor in how it rates vehicles in the safety group's consumer information program.

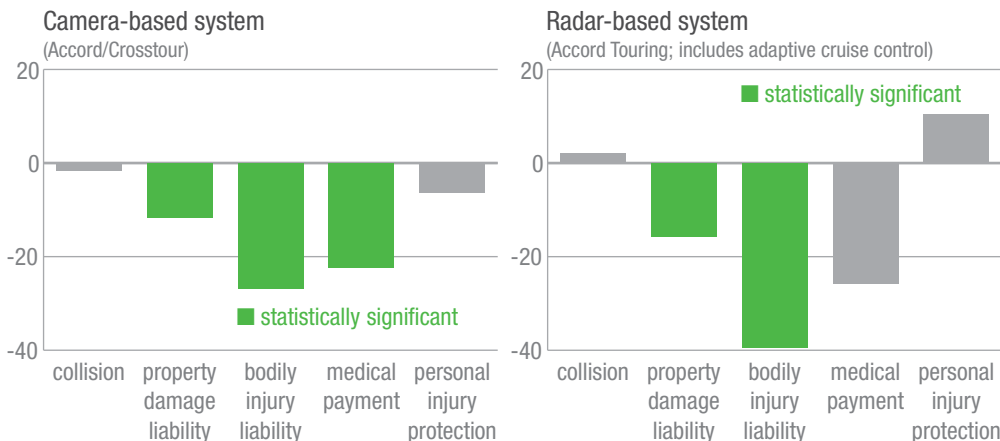
S60s and XC60s with City Safety and for comparable vehicles without a low-speed front crash prevention system repaired under PDL coverage. These analyses would reveal if there were any increases in crash configurations where another vehicle was at fault. HLDI couldn't find any measurable difference between the study and control groups, indicating that City Safety doesn't increase

» Honda forward collision warning

The Honda Accord's optional forward collision warning system operates at speeds above 10 mph and comes paired with lane departure warning. HLDI first looked at

these systems a year ago (*see Status Report*, May 29, 2014). These warning systems are standard equipment on some Accord trim levels and on the Honda Crosstour, an SUV built on the Accord platform.

Percent differences in claim frequency for Hondas equipped with forward collision and lane departure warning features



The updated results are similar to last year's. Compared with Accords and Crosstours without the features, those with the features saw claim frequency reductions under all coverages. Only the reductions under property damage liability (12 percent), bodily injury liability (27 percent) and medical payment (22 percent) are statistically significant. Medical payment insurance covers injuries to occupants of the insured vehicle.

The Accord's main forward collision warning system relies on a camera located inside the windshield. However, the Touring trim has a different system, one that uses radar to detect vehicles in front. In addition to forward collision and lane departure warning, this version of the feature also includes adaptive cruise control.

The radar-based system showed reductions in claim frequency for all coverages except collision and personal injury



the likelihood of being struck in the rear.

Euro NCAP says its findings support the group’s decision to include autobrake as a factor in its safety ratings program for consumers. Both NCAPs are making a push to require the feature as standard in new vehicles sold in Australia and Europe.

The National Highway Traffic Safety Administration in January announced plans

to add autobrake to the U.S. NCAP’s list of recommended advanced safety features.

Under the IIHS ratings program, a front crash prevention system with autobrake is one of the criteria required to earn a *TOP SAFETY PICK+* award. IIHS assigns models with available front crash prevention systems basic, advanced or superior ratings based on system type and performance in track tests.

“Effectiveness of low speed autonomous emergency braking in real-world rear-end crashes” by B. Fildes et al., appears in the August 2015 issue of *Accident Analysis and Prevention*. “Real-world performance of City Safety based on Swedish insurance data” by I. Isaksson-Hellman and M. Lindman can be accessed at www.volvia.se/sitecollectiondocuments/volvia/esv%2015-0121.pdf. ■

protection, which is sold in states with no-fault insurance systems and covers injuries to people in the insured vehicle. Only the results for property damage liability (16 percent) and bodily injury liability (39 percent) were statistically significant.

Not surprisingly, collision claim severity was much higher for vehicles with the radar-based system. The average cost per claim was \$522 higher for equipped vehicles. That likely reflects the cost of repairing the radar system after crashes that weren’t avoided. The radar units are located in the front grille and are therefore much more vulnerable to damage than cameras located inside the occupant compartment.

Subaru EyeSight

Subaru’s optional, camera-based EyeSight system is one of the few front crash prevention systems to earn a perfect score in IIHS ratings. The system warns of impending

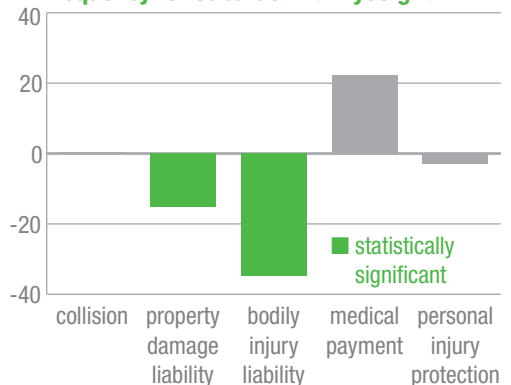
crashes and, if the driver fails to stop, brakes automatically. The autobrake function completely avoids collisions in both the 12 mph and 25 mph IIHS tests. In addition to front crash prevention, EyeSight includes adaptive cruise control, lane departure warning and lead vehicle start alert, which notifies the driver if the vehicle remains stopped several seconds after a vehicle in front has moved.

For the model years in the study, EyeSight was available on the Forester, Legacy and Outback. HLDI found that when those models were equipped with the feature, property damage liability claim frequency was 15 percent lower and bodily injury liability frequency was 35 percent lower. Results under other coverages were mixed but not statistically significant.

For copies of the HLDI reports “Volvo City Safety loss experience — a long-term update,” “Volvo City Safety loss experience by vehicle age,” “Honda Accord collision

avoidance features,” and “Subaru collision avoidance features: an update,” email publications@iihs.org. ■

Percent differences in claim frequency for Subarus with EyeSight



Claim frequency was statistically lower under 2 coverage types for Subaru Forester, Legacy and Outback models with EyeSight.

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IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from crashes on the nation's roads.

HLDI shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

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