

Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

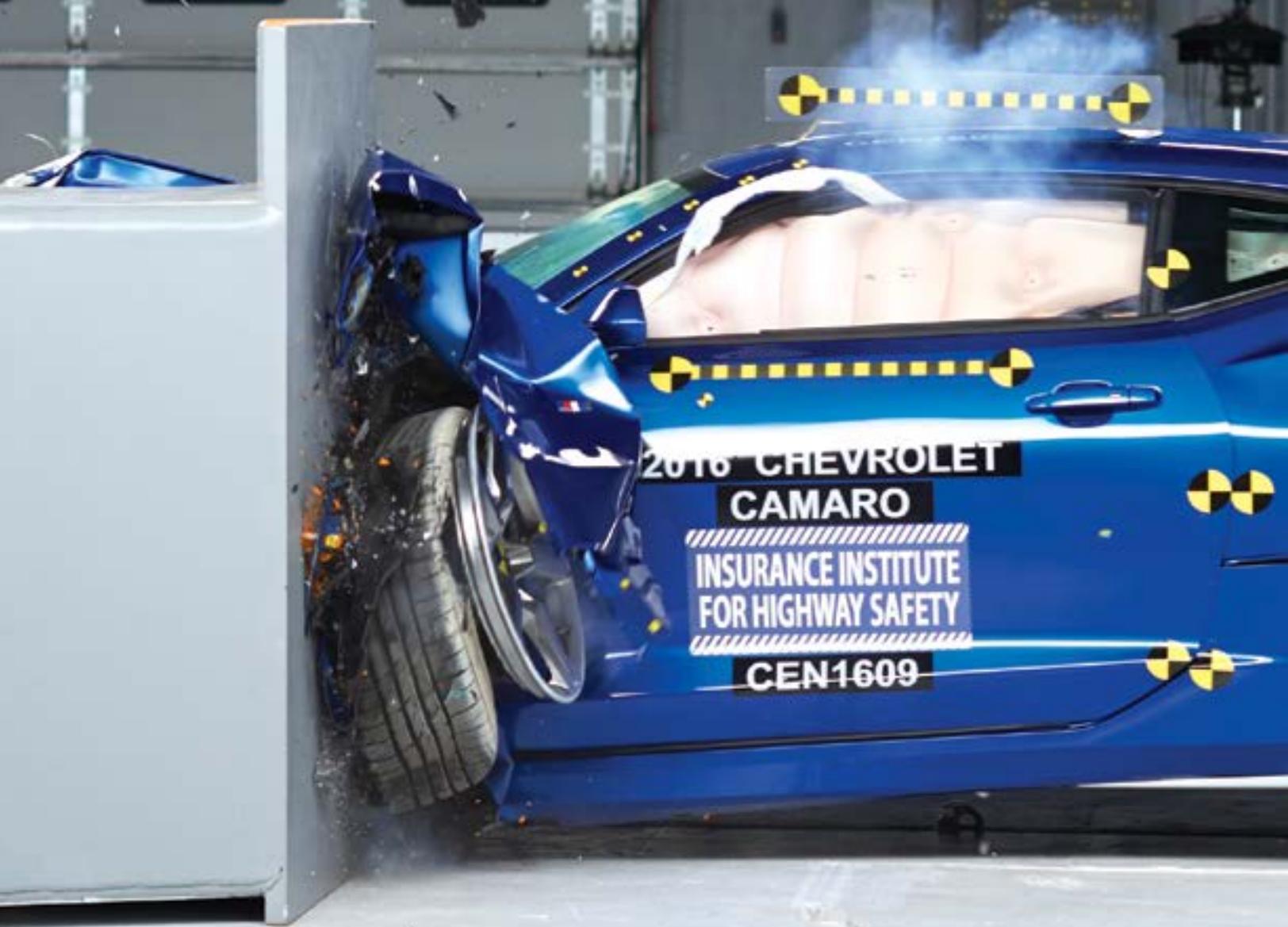
Flexing muscle

Sports car ratings show range of performance



**ALSO IN
THIS ISSUE**
Vol. 51, No. 5
May 24, 2016

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- ▶ Interlocks reduce alcohol crash deaths
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Sports cars may be fast, but are they as safe as more sedate sedans?

Think “muscle car” performance, and images of speed and power are more likely to come to mind than crash tests and safety ratings. Because no one buys a sports car to drive in the slow lane, the best all-around occupant crash protection is crucial. IIHS recently put a trio of iconic sports coupes through their paces, and unlike more sedate sedans, none earns the scores needed to clinch a *TOP SAFETY PICK* award.

IIHS evaluated 2016 models of the Chevrolet Camaro, Dodge Challenger and Ford Mustang in the full battery of crashworthiness evaluations. The Mustang comes

closest to earning *TOP SAFETY PICK*, while the Camaro falls short in one category and lacks an available front crash prevention system. The Challenger is most in need of improvement.

To qualify for *TOP SAFETY PICK*, vehicles must earn good ratings in the small overlap front, moderate overlap front, side, roof strength and head restraint evaluations and have a basic-rated front crash prevention system. To qualify for the Institute’s highest award, *TOP SAFETY PICK+*, vehicles must earn good ratings in the five crashworthiness tests and an advanced or superior rating for front crash prevention.

IIHS doesn’t typically crash-test sports cars as they make up a small share of the consumer market. IIHS engineers decided to evaluate these models with optional V-8 engines because they are big sellers in their class, and consumers often ask how they would perform in crash tests.

Insurance data point to high losses for sports cars. As a group, they have the highest losses among passenger vehicles for crash damage repairs under collision coverage, data from the Highway Loss Data Institute show. Collision coverage insures against physical damage to the at-fault policyholder’s vehicle in a crash.



How 2016 sports cars rate in IIHS evaluations

	Small overlap front	Moderate overlap front	Side	Roof strength	Head restraints & seats	Front crash prevention
Chevrolet Camaro	G	G	G	A	G	Not available
Ford Mustang	A	G	G	G	G	Basic
Dodge Challenger	M	G	G	A	A	Basic

crashworthiness: Good **G** Acceptable **A** Marginal **M** Poor **P**
 front crash prevention: Basic (4 bars) Not available (0 bars)

Small overlap front test results were mixed. The Camaro's safety cage resisted intrusion, while the driver's survival space wasn't well-maintained in the Mustang. In the Challenger test, the force of the crash shoved the wheel back toward the occupant compartment, and the resulting intrusion trapped the dummy's left foot.

Small overlap front test

Chevrolet Camaro

G



Ford Mustang

A



Dodge Challenger

M



“Given that sports cars have high crash rates, it’s especially important that they offer the best occupant protection possible in a crash,” says Adrian Lund, IIHS president.

The Camaro, Challenger and Mustang earn good ratings for occupant protection in a moderate overlap front crash, as well as a side impact.

In the newest and toughest IIHS crashworthiness evaluation, the small overlap front test, the Camaro earns a good rating, the Mustang earns acceptable, and the Challenger is rated marginal.

“The Mustang is just one good rating away from earning *TOP SAFETY PICK*”

Lund points out. “Its small overlap rating holds it back.”

Added in 2012, the small overlap test replicates what happens when a vehicle runs off the road and hits a tree or pole or clips another vehicle that has crossed the center line. In the test, 25 percent of the total width of the vehicle strikes the 5-foot-tall rigid barrier on the driver side at 40 mph. It is an especially challenging test because it involves a vehicle’s outer edges, which aren’t well-protected by the crush-zone structures. Crash forces go directly into the front wheel, suspension system and firewall.

The Challenger wasn’t up to the challenge of the small overlap test. Extensive intrusion into the lower occupant compartment limited the driver’s survival space and resulted in a poor rating for structure and for leg/foot protection. Measures taken from the dummy indicate a high likelihood of serious lower leg injuries.

“During the crash, the Challenger’s front wheel was forced rearward into the occupant compartment, and the footwell intrusion trapped the dummy’s left foot and deformed its ankle,” Lund explains. “Our technicians had to unbolt the dummy’s foot from its leg in order to free it. Entrapment »

The Dodge Challenger struggled in the small overlap test. Extensive occupant compartment intrusion limited survival space for the driver. The footwell deformed around the dummy's left foot, and technicians had to unbolt the dummy's leg to free it from the wreckage.



Vehicles are packing more horsepower, and the trend is influencing travel speeds

The association between higher speed limits and faster vehicle speeds is well-established, but not as much is known about how horsepower affects travel speeds. A new IIHS study finds that high-horsepower vehicles are more likely to exceed the speed limit, particularly by 10 mph or more, and have higher mean speeds than vehicles with less powerful engines.

Faster speeds increase both the risk of crashing and the severity of injuries that occur. IIHS research has shown that rising speed limits have resulted in higher fatality rates (see *Status Report*, April 12, 2016, at iihs.org).

“We know that speeds and fatality rates are going up, and part of the problem is that states have raised speed limits. What this new study tells us is that a trend toward more powerful engines is also to blame,” says Chuck Farmer, the Institute’s vice president for research and statistical services.

It’s not just sports cars that are packing more power. Even mainstream sedans have high-performance capabilities. From model year 1985 to model year 2015, mean vehicle power, defined as horsepower per 100 pounds of vehicle weight,

increased by 60 percent for cars, 65 percent for pickup trucks and 66 percent for SUVs, data from the Highway Loss Data Institute (HLDI) show. Prior analysis by HLDI indicates that vehicle power is strongly associated with higher insurance losses (see *Status Report* special issue: Speed, Jan. 31, 2008).

In the new study, IIHS researchers used speed cameras to collect speeds of free-flowing traffic on heavily traveled roads in Northern Virginia with various speed limits during off-peak hours in spring 2013, as well as photographs of license plates and drivers. License plate numbers were sent to driver licensing agencies to obtain vehicle identification numbers (VINs) and the vehicle owner’s age, gender and ZIP code. Vehicles were included in the study if the age and gender of the photographed driver matched the owner’s age and gender. VINs were decoded to obtain the curb weight and horsepower of vehicles. Researchers calculated the effects of vehicle power on mean travel speeds and estimated the effects of vehicle power on the likelihood of a vehicle traveling over the speed limit and more than 10 mph over the limit.

A 3-unit increase in horsepower per 100 pounds of vehicle weight was associated with a 38 percent increase in the likelihood of a vehicle exceeding the speed limit by more than 10 mph, a 7.7 percent increase in the likelihood of a vehicle exceeding the speed limit by



(« from p. 3) is pretty rare. That’s only happened five other times in a small overlap test.”

In contrast, survival space for the driver in the Camaro was well-maintained, and the risk of injuries to the dummy’s legs and feet was low. The Camaro was redesigned for the 2016 model year.

“The Camaro’s safety cage is built to resist intrusion in a small overlap crash, and that’s good news for Camaro drivers,” Lund says.

The Mustang’s structural performance in the small overlap test fell short of the Camaro’s but was an improvement over the Challenger. The roof buckled, and the driver’s survival space was compromised by considerable intrusion of the door hinge pillar and instrument panel. Still, measures taken from the dummy indicated low risk of injuries to all body regions, including the legs and feet.

The Camaro and Mustang earn good ratings for head restraints and seats to protect against neck injuries in rear crashes. The Challenger’s head restraints are rated acceptable.

The Mustang earns a good rating for roof strength, and the Camaro and Challenger earn acceptable. Stronger roofs crush less in rollovers, reducing the risk that people will be injured by contact with the roof itself and the risk that unbelted occupants will be ejected. Strong roofs are especially important for sports cars, which have among the highest driver death rates in single-vehicle rollovers (see *Status Report*, Jan. 29, 2015).

Ford and Dodge offer optional forward collision warning systems on the Mustang and Challenger, and both coupes earn a basic rating for front crash prevention because their systems meet performance criteria set by the National Highway Traffic Safety Administration. ■

any amount and a 2.2 percent increase in mean vehicle speed, IIHS found. This was the case after controlling for driver characteristics, speed limit, vehicle type and traffic volume. A 3-unit increase in vehicle power is equivalent to an increase of 90 horsepower for a mid-size 3,000-pound car.

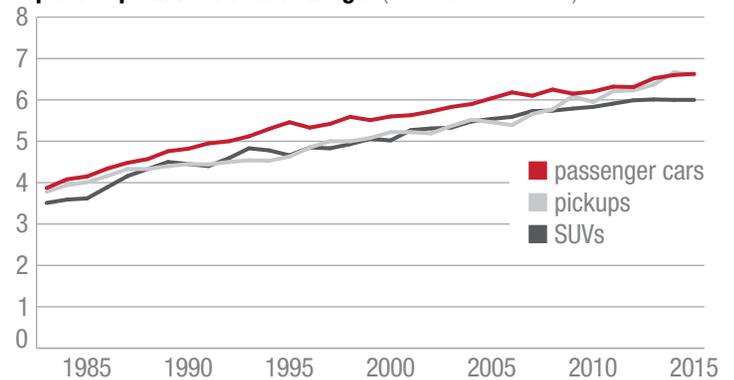
To illustrate how increasing vehicle power affects travel speeds, researchers compared the 1981 Honda Accord and the base model 2015 Accord midsize sedan. The 1981 Accord with a 4-cylinder engine has 75 horsepower and a curb weight of 2,249 pounds, yielding a vehicle power of 3.3 horsepower per 100 pounds of vehicle weight. The 2015 Accord base model with a 4-cylinder engine has 185 horsepower and a curb weight of 3,254 pounds, yielding a vehicle power of 5.7 per 100 pounds.

A vehicle with the same vehicle power as the 2015 Accord would travel an estimated 1.7 percent faster on average and have a 6.1 percent higher likelihood of speeding and a 29 percent higher likelihood of speeding by more than 10 mph, compared with a vehicle meeting the 1981 Honda’s vehicle power, the study found.

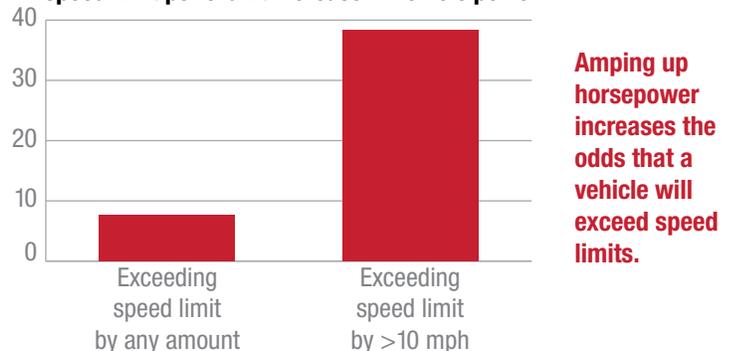
The effects are magnified as horsepower increases. The 2015 Dodge Challenger SRT Hellcat, for example, has 707 horsepower and a curb weight of 4,439 pounds, giving it a vehicle power of 15.9. IIHS researchers estimate that a vehicle matching the 2015 Hellcat’s power would travel nearly 10 percent faster on average and have a 26 percent higher likelihood of speeding and a 233 percent higher likelihood of speeding by more than 10 mph relative to a vehicle with the power of a 1981 Honda.

For a copy of “Effects of vehicle power on passenger vehicle speeds” by A.T. McCartt and W. Hu, email publications@iihs.org. ■

Trends in mean passenger vehicle horsepower per 100 pounds of vehicle weight (1985-2015 models)



Percent increase in likelihood of exceeding speed limit per 3-unit increase in vehicle power



Interlocks cut alcohol-related crash deaths

Laws that require alcohol interlocks for anyone convicted of driving under the influence (DUI) of alcohol or drugs have reduced alcohol-involved crash deaths by 15 percent, a study by researchers at the University of Pennsylvania found.

Interlocks prevent people who have been drinking alcohol from starting their cars. Drivers must blow into a breath-testing unit, and if the reading exceeds a preset level, the vehicle won't start.

Penn researchers mined federal fatal crash data from the 18 states that mandated interlocks for all DUI convictions by 2013 and the 32 states with less-stringent laws.

The findings further bolster the evidence that mandatory interlocks prevent alcohol-impaired driving. Previous studies by IIHS and other groups have found that offenders who get interlocks are much less likely to be arrested again on DUI charges than those who don't.

For example, an IIHS study of the effects of Washington's interlock requirement found a 12 percent drop in the recidivism rate after the state expanded its interlock requirement to cover everyone convicted of DUI (see *Status Report*, March 6, 2012, at ihs.org). The law change was associated with an 8.3 percent reduction in single-vehicle late-night

during the study period as factors that could have lowered the effectiveness of interlock requirements in the study states.

Mandatory interlocks may be the key to reigniting stalled progress in reducing the number of alcohol-impaired driving deaths, which plunged during the 1980s and early 1990s. Since then, the proportion of fatally injured drivers with a blood alcohol concentration (BAC) of 0.08 percent or higher has remained at about one-third. In 2014, 6 percent of drivers with BACs of 0.08 percent or higher who were involved in fatal crashes had previous alcohol-impaired driving convictions within the past three years on their records. IIHS estimates that 650 of the deaths in 2014 could have been prevented if these drivers had zero BACs.

"Although crashes and crash fatalities decline, we're not seeing a significant reduction in the proportion of those involving alcohol," says the study's senior author, Douglas J. Wiebe. "We're encouraged by the increasing number of states enacting mandatory interlock laws since 2013 and hope these findings advance public health conversations aimed at saving more lives."

In May, Maryland became the 27th state to mandate interlocks for all drivers convicted of DUI. An additional 12 states require interlocks for offenders with high BACs (usually 0.15 percent or higher) and for repeat offenders, five states and certain California counties require them only for repeat offenders, and one state requires them only for high-BAC offenders and offenders convicted of a felony regardless of BAC. Four states and Washington, D.C., have no mandatory interlock requirements.

An estimated 318,714 interlocks were in use during 2014 in the U.S.

The advocacy group Mothers Against Drunk Driving in a report published in February estimates that ignition interlocks have prevented more than 1.77 million would-be alcohol-impaired drivers in the U.S. from starting their vehicles since states first passed ignition interlock laws.

"Impact of state ignition interlock laws on alcohol-involved crash deaths in the United States" by E.J. Kaufman and D.J. Wiebe appears in the May 2016 issue of the *American Journal of Public Health*. ■

A driver blows into a breath-testing unit that checks for the presence of alcohol. If the reading exceeds a preset level, the car won't start.



They compared the number of alcohol-involved crash deaths during 1999-2013 for the two groups of states, controlling for such factors as annual vehicle miles traveled, state highway speed limits and traffic law changes.

Compared with states having less stringent laws, those states with mandatory interlock laws saw a decrease of 0.8 deaths for every 100,000 people each year. The researchers note that this is comparable to the estimated number of lives saved by frontal airbags (0.9 lives saved per 100,000 people).

In states with universal interlock laws, 915 lives were saved between 2007-13, the researchers estimate. The authors assumed that the laws had no effect in the first three years after implementation.

crash risk, suggesting a general deterrent effect of the expanded interlock requirement.

Not all offenders covered by interlock laws actually install them. Some risk driving on a suspended license during the interlock period for economic and personal reasons. IIHS research indicates that laws requiring all DUI offenders to drive with an interlock before regaining their full license would result in further reductions in recidivism.

The Penn study authors note that their findings likely underestimate the potential effect of universal interlocks. They cite failure to install interlocks by all drivers required to use them; differences in enforcement among states; local laws that are stricter than state requirements and changes in penalties, monitoring and administration

India is latest to require motorcycle ABS; no action in U.S. despite clear evidence

India has joined a growing number of countries that require antilock braking systems (ABS) on motorcycles — an important step for highway safety that U.S. regulators have yet to take.

ABS prevents wheels from locking up, allowing riders to brake fully in an emergency. It's essential safety equipment for motorcycles. The technology cuts fatal motorcycle crashes by 31 percent and insurance claims for rider injuries by 28 percent (see *Status Report*, May 30, 2013, at ihs.org).

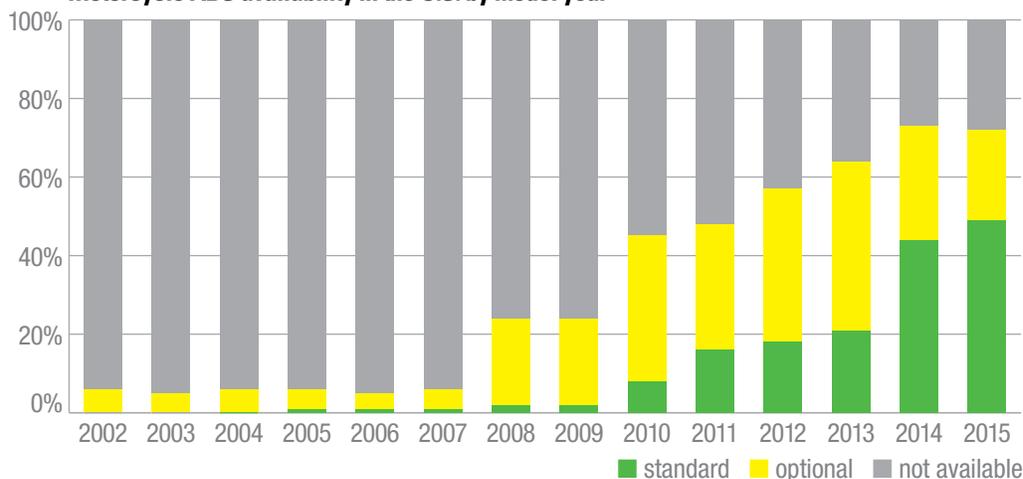
“Motorcycle ABS saves lives, and it’s good to see highway safety regulators around the globe recognizing that fact,” says Adrian Lund, president of IIHS and HLDI. “We hope NHTSA will be next, so that all riders in the U.S. can benefit from this technology, too.”

Despite the lack of a U.S. mandate, motorcycle ABS has become more widely available in recent years. Nearly half of 2015 model motorcycles registered in the U.S. had standard ABS, while another 23 percent had it available as an option. That’s

Dinesh Mohan, an Indian highway safety expert and former IIHS researcher, estimates that if all motorcycles on the road in India had ABS, it would reduce overall traffic fatalities by more than 10 percent. That’s about double the reduction he estimates would result from airbags in every passenger vehicle plus universal safety belt use.

However, the new rule won’t come close to that kind of an effect because most motorcycles sold in India will be exempt. For bikes with engines of 125 cc or less,

Motorcycle ABS availability in the U.S. by model year



Based on those findings, IIHS and HLDI petitioned the National Highway Traffic Safety Administration (NHTSA) in 2013 to require ABS on new motorcycles. The agency hasn’t responded to the petition.

Meanwhile, other countries are moving forward. India’s rule, announced in March, will require all new motorcycles with an engine displacement of more than 125 cc to have ABS beginning in April 2018. Carryover models get another year to comply.

In the European Union, new models over 125 cc must have ABS as of this year, and carryover models must have it next year. The same requirement will take effect in Japan in 2018 for new models and 2021 for carryovers and in Taiwan in 2019 for new models and 2021 for carryovers. In Brazil, mandatory ABS for motorcycles with 300 cc engines or greater is being phased in through 2019.

a big jump since 2008, when it was standard on just 2 percent of motorcycles and optional on 22 percent.

Nearly 4,300 motorcyclists were killed in the U.S. in 2014, accounting for 13 percent of all crash deaths. A motorcycle ABS requirement could put a significant dent in overall fatalities, which, according to preliminary 2015 data, are on the rise (see *Status Report*, Dec. 10, 2015).

In India, the impact of ABS could potentially be even greater, since there are far more motorcycles than cars there. More than 137,000 people were killed in crashes in India in 2013, and about one-third of them were riders of motorized two- or three-wheelers, according to government statistics. (The World Health Organization says the total number of fatalities is actually higher — more than 200,000.)



A rider demonstrates a motorcycle equipped with ABS on the Institute’s test track.

manufacturers can install either ABS or a combined braking system (CBS), which integrates front and rear brake controls. It’s not known how effective CBS is by itself, though HLDI research has shown that the combination of ABS and CBS is more effective than ABS alone (see *Status Report*, May 30, 2013).

Small engines are far more common in India, where motorcycles serve as a low-cost commuting option, than in the U.S., where recreational riding is the norm. Out of more than 16 million motorcycles sold in India in the year beginning April 2015, 86 percent had engines of 125 cc or less, according to statistics compiled by the Society of Indian Automobile Manufacturers.

Still, Mohan points out, in just the first year the new rule will improve safety for the 2.3 million Indian motorcycle riders who purchase larger bikes. ■

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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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