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Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

Safety mettle

Ford F-150 crew cab aces IIHS evaluations,
but extended cab struggles in key test

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July 30, 2015

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Ford F-150 crew cab

The 2015 Ford F-150 crew cab and extended cab share top ratings in 4 of 5 IIHS tests. Good small overlap protection clinches a *TOP SAFETY PICK* award for the crew cab.

The aluminum-body 2015 Ford F-150 crew cab swept the full slate of IIHS crashworthiness evaluations to qualify for a 2015 *TOP SAFETY PICK* award. The F-150 extended cab turned in a good performance in 4 of 5 assessments but stumbled in the small overlap front test. The results are the first ratings for large pickups in a group the Institute is evaluating this year.

The F-150 crew cab, which Ford calls the SuperCrew, earns good ratings for occupant protection in all five IIHS crashworthiness evaluations — small overlap front, moderate overlap front, side, roof strength and head restraint evaluations. The extended cab, or SuperCab, earns good ratings in the moderate overlap front, side, roof strength and head restraint evaluations but just a marginal rating for occupant protection in a small overlap front crash.

Crew-cab pickups have four full doors and two full rows of seating. Extended cabs have two full front doors, two smaller rear doors and compact second-row seats. Both cab types make up a bigger share of the pickup truck market than regular cabs. Crew cabs accounted for 50 percent, extended cabs 43 percent and regular cabs 7 percent of 2013 model pickups in HLDI's vehicle database.

The Institute picked the F-150 to test first because it is not only the best-selling vehicle in the U.S. but also the first mass-market vehicle

with an all-aluminum body. Automakers have used the lightweight metal to build engines, wheels, hoods, fenders and trunk lids for more than 20 years, but its use in the whole vehicle body is uncommon. Other mostly aluminum offerings are luxury models — the Acura NSX, Audi A8, Range Rover and Tesla Model S, for example.

Ford's choice of aluminum for the F-150 body means the pickup is about 500 pounds lighter than the 2014 steel-body F-150. The underlying frame — the workhorse of crash protection — still is made of steel.

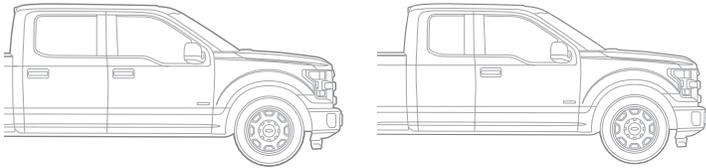
"Consumers who wondered whether the aluminum-body F-150 would be as crashworthy as its steel-body predecessor can consider the question answered," says David Zuby, the Institute's chief research officer.

Both the crew cab and extended cab F-150 pickups are rated basic for front crash prevention when equipped with Ford's optional forward collision warning system, which meets performance criteria set by the National Highway Traffic Safety Administration (NHTSA). The F-150 crew cab isn't eligible for *TOP SAFETY PICK+* because it lacks an autonomous braking system.

Vehicles that earn a good or acceptable rating for small overlap protection and good ratings in the moderate overlap front, side, roof



2015 Ford F-150 ratings



TSP crew cab extended cab

CRASHWORTHINESS		
G	small overlap front	M
G	structure	P
G	restraints & kinematics	A
dummy injury measurements		
G	head & neck	G
G	chest	G
G	hip & thigh	A
G	lower leg & foot	A
G	moderate overlap front	G
G	side	G
G	roof strength	G
G	head restraints & seats	G

FRONT CRASH PREVENTION



Good **G** Acceptable **A** Marginal **M** Poor **P**

The crew cab's occupant compartment (top) resisted intrusion in the small overlap front test. The safety cage is largely intact. In the extended cab test, there was significant intrusion. The steering wheel is close to the dummy's chest, and the dummy's legs are jammed against the instrument panel.

strength and head restraint evaluations qualify for *TOP SAFETY PICK*. To earn *TOP SAFETY PICK+*, vehicles also must have an available autobrake system that earns an advanced or superior rating.

Why two models were evaluated

NHTSA evaluated the crew cab, extended cab and regular cab versions of the 2015 F-150. Each received the top 5-star safety rating for front and side crash protection in the agency's New Car Assessment Program (safercar.gov) and 4 stars for rollover protection.

For vehicles with multiple body styles, the Institute typically evaluates the one with the biggest sales. Initially, only the F-150 crew cab was on the schedule.

"After we tested the crew cab in the spring, questions were raised about the extended cab's ability to match the crew cab's good small

overlap performance. We did some initial analysis and decided to test the extended cab, too," Zuby says.

While a departure from the Institute's usual practice, the F-150 merits a closer look.

"For starters, there's been lots of buzz around the release of the first aluminum-body pickup and how it would perform in crash tests," Zuby says. "What's more, even the lower-selling extended cab sales top those of many of the passenger vehicles we rate."

To provide consumers with more safety information, IIHS plans to rate multiple variants of the other pickups slated for tests this year.

Striking differences in small overlap test

In the small overlap front test, each F-150 traveled at 40 mph toward a 5-foot-tall rigid barrier. Twenty-five percent of the pickup's total

width struck the barrier on the driver side, where a Hybrid III dummy representing an average-size man was positioned at the steering wheel. The test replicates what happens when the front corner of a vehicle collides with another vehicle or an object such as a tree or a utility pole.

The two versions of the F-150 had markedly different outcomes. Inspect the images from the tests and it's easy to see why the crew cab is rated good and the extended cab is rated marginal.

"In a small overlap front crash like this, there's no question you'd rather be driving

the crew cab than the extended cab F-150," Zuby says.

The crew cab's occupant compartment remained intact. The front-end structure crumpled in a way that spared the occupant compartment significant intrusion and preserved survival space for the driver.

Measures recorded on the test dummy indicated low risk of injuries to the dummy's head, chest, legs and feet. The front and side curtain airbags worked together to keep the dummy's head from contacting injury-producing stiff interior structures or outside objects. The dummy's head loaded

shortchanges buyers who might pick the extended cab thinking it offers the same protection in this type of crash as the crew cab. It doesn't."

The Institute has briefed Ford on the results. In a statement, the manufacturer said, "Ford is evaluating possible changes to the extended cab for small offset performance."

Moderate overlap, side and roof tests

The Institute assigned the crew cab and extended crew models good ratings for occupant protection in a moderate overlap front crash based on test data shared by Ford

The extended cab's occupant compartment collapsed in the small overlap test, seriously compromising survival space for the driver.



Ford F-150 extended cab



This undercarriage view of the crew cab (top) and extended cab shows where Ford beefed up the crew cab's front frame. IIHS painted the added elements red and yellow.

the front airbag, which stayed in place until the dummy rebounded.

The extended cab is a different story. Intruding structure seriously compromised the driver's survival space, resulting in a poor structural rating. The toepan, parking brake and brake pedal were pushed back 10-13 inches toward the dummy, and the dashboard was jammed against its lower legs. Measures recorded on the dummy indicated there would be a moderate risk of injuries to the right thigh, lower left leg and left foot in a real-world crash of this severity.

The steering column was pushed back nearly 8 inches and came dangerously close to the dummy's chest. The dummy's head barely contacted the front airbag before sliding off to the left and hitting the instrument panel.

"Ford added structural elements to the crew cab's front frame to earn a good small overlap rating and a *TOP SAFETY PICK* award but didn't do the same for the extended cab," Zuby observes. "That

for both cab styles as part of the Institute's front crash-test verification process. The F-150 qualifies for the program because the earlier-generation models were rated good in this test.

In the side impact test for both models, measures taken from both the driver dummy and the passenger dummy seated in the rear seat indicated low risk of significant injuries in a real-world crash like this one. The side curtain airbag deployed from the roof to protect the dummies' heads from hitting any hard structures, including the intruding 3,300-pound SUV-like test barrier striking the driver side at 31 mph.

The crew cab's roof withstood a force of nearly 6 times the pickup's weight and the extended cab's roof withstood a force of 5.3 times the pickup's weight, an indication that the roofs will help protect occupants in rollover crashes.

The IIHS ratings apply to the 2015 SuperCrew F-150 and the SuperCab F-150 only. The Institute hasn't evaluated the 2015 regular cab. ■

Pricier repairs for aluminum F-150 pickup than steel model in fender-bender crashes

The Ford F-150 crew cab scores high marks for crashworthiness, but when it comes to damage in low-speed crashes, the aluminum-body pickup is pricier to repair than its steel-bodied predecessor, the Institute found.

A report released last year by HLDI examined the costs to repair aluminum vehicles after low-speed impacts. Analysts found a 20 percent increase in the average collision claim severities in vehicles with high aluminum content compared with their steel counterparts. Collision coverage insures against vehicle damage to an at-fault driver's vehicle in a crash with another vehicle or object.

To assess whether higher repair costs also would be the case for the F-150, IIHS engineers ran low-speed crash tests with the new F-150 crew cab and the 2014 steel-body F-150 to compare repair costs.

In one test, the front left corner of the steel-body F-150 struck the right rear corner of the aluminum truck at 10 mph with a 15 percent overlap. In the second test at the same speed and overlap, the front left corner of the aluminum pickup struck the rear corner of the steel model.

In both scenarios, the aluminum F-150 had more extensive damage than the steel model. IIHS researchers had both trucks repaired at a Ford dealership certified for aluminum repairs. The costs to fix front test damage were \$4,147 for the aluminum model and \$3,759 for the steel model. In the rear test, the aluminum F-150 had \$4,738 in damage, while the repair bill for the steel-body F-150 came in at \$3,275.

Total repair costs for front and rear damage combined were 26 percent higher for the aluminum F-150 pickup, in line with HLDI's finding on collision claim severities for other vehicles with high-aluminum content.

"From a simple bolt-on parts replacement to a more-involved removal and installation of entire body panels, fixing the aluminum F-150 is more expensive than repairing a steel-body F-150," says David Zubly, the Institute's chief research officer.

Extra time to repair the aluminum body accounted for the higher price to fix frontal damage, while higher parts costs pushed up the repair bill for the rear damage.

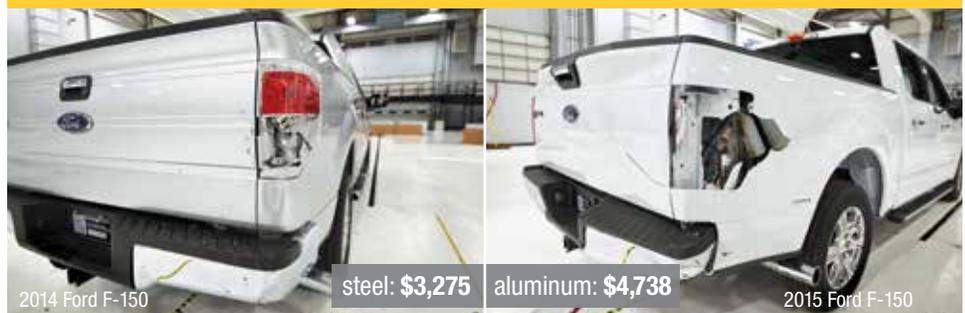
It took more time to repair the aluminum model's front damage, mainly because mechanics had to assemble components such as wiring harnesses and splash guards

Besides repair costs, there are other considerations with aluminum-body vehicles. To avoid steel/aluminum cross-contamination that leads to corrosion, these vehicles need to be repaired in a separate area, with dedicated tools and gear used by mechanics who are trained to do the intricate welding, riveting and bonding aluminum requires.

Test damage repair costs: steel vs. aluminum F-150 | 10 mph impact with 15 percent overlap



The aluminum F-150 took longer to repair than the steel pickup, pushing up the bill for the front test. Mechanics had to assemble wiring and other components before a new fender could go on.



Both pickups had damage to their beds, tailgates and exhaust pipes in the rear test. The aluminum model needed a new bed; the steel bed could be repaired.

under the ruined front fender before a new one could be attached. Labor costs were 22 percent higher for the 2015 model.

After being struck in the rear, one side of the aluminum F-150's truck bed needed replacing. In contrast, the steel model's bed could be repaired. Both trucks needed new tail lamps, bumpers and exhaust pipes. The aluminum F-150's total parts costs to fix rear damage were 42 percent higher than the steel model's total.

Industry watchers expect automakers to use more aluminum in vehicles. By 2025, more than 75 percent of all new pickups produced in North America are expected to be aluminum-bodied, along with more than 20 percent of SUVs and full-size cars, according to a Ducker Worldwide survey of original equipment manufacturers and suppliers published in June 2014 (www.drivealuminum.org/research-resources/PDF/Research/2014/2014-ducker-report). ■

NHTSA to crack down on unsafe motorcycle helmets

This rider is wearing a novelty helmet with a counterfeit “DOT” sticker.

Regulation helmets are vital safety gear for motorcyclists, and 19 states and the District of Columbia require all riders to wear them. Some motorcyclists may try to skirt helmet laws by donning flimsy novelty helmets that offer little-to-no protection in a crash. Others may pick novelty helmets because they don't understand the safety benefits of certified helmets. U.S. regulators over the years have tried to make it harder to pass off fake helmets as bona fide ones, but they are still on the market. Now, the National Highway Traffic Safety Administration (NHTSA) is proposing a series of rule changes that should make it harder for retailers to sell novelty helmets and easier for riders and police officers to distinguish between safe and unsafe ones.

Novelty helmets don't provide good head coverage, and their thin foam liners and lightweight shells can't absorb energy or adequately cushion a rider's head during a crash. They often have weak chinstraps that could come undone in a crash. Novelty helmets are marketed to motorcyclists online and sold at motorcycle outfitters alongside sturdier, well-padded regulation headgear with the proviso that they aren't meant for use on the highway or as protective equipment. A typical warning label sewn into the interior fabric lining indicates that the “novelty head wear” doesn't meet any safety standards.

Novelty helmets put riders in a crash at higher risk of a brain injury or a skull fracture than certified helmets (see *Status Report* special issue: motorcycles, Sept. 11, 2007, at

iihs.org). A 2009 NHTSA study of motorcyclists injured in crashes and transported to a Baltimore shock trauma center during 2007-08 showed that 56 percent of those wearing a novelty helmet had serious head injuries, compared with 19 percent of riders who were wearing a helmet certified by the U.S. Department of Transportation (DOT).

Under the May notice of proposed rule-making, NHTSA says it considers motorcycle helmets to be subject to federal regulation as motor vehicle equipment under the National Traffic and Motor Vehicle Safety Act of 1966. At the same time, the agency aims to add a clear definition of “motorcycle helmet” to Federal Motor Vehicle Safety Standard (FMVSS) No. 218. A helmet would qualify as a motorcycle helmet if it is manufactured or sold with the apparent purpose of protecting riders on the highway; if it is made or sold by companies that sell regulation helmets and motorcycle gear; or if the headgear is packaged and/or advertised or imported as a motorcycle helmet.

The agency also wants to amend FMVSS No. 218 to create a set of physical screening criteria to identify helmets for performance testing, streamline federal compliance tests and help law enforcement officials identify noncompliant helmets. The proposed new dimensional and compression requirements would address things such as the thickness and resilience of a helmet's liner and shell. For example, inner liners would have to be at least 0.75 inch thick, and the

Novelty headgear vs. DOT-certified motorcycle helmet



novelty helmet

regulation helmet

The differences between a novelty helmet (above left) and a DOT-certified motorcycle helmet (above right) are striking. The novelty helmet has thin padding and a chin strap akin to a child's toy. An interior label states that the “novelty head wear does not meet safety standards of any description.” The regulation helmet has a thickly padded inner liner and sturdy chin strap.

inner liner and shell combined would need to be at least 1 inch thick to meet FMVSS No. 218 standards.

In the case of suspect helmets on the road, police officers could easily check liner and shell dimensions with a caliper or ruler.

Most states with motorcycle helmet use laws require riders to wear DOT-certified helmets. In 2014 in states with universal helmet use laws, 89 percent of motorcyclists were observed wearing DOT-compliant helmets and 7 percent were observed wearing noncompliant helmets, NHTSA's National Occupant Protection Use Survey found. Helmet use is sharply lower in states without universal helmet laws.

NHTSA has tried to crack down on novelty helmets in the past by focusing on labeling requirements.

Regulation helmets are sold with a DOT label on the back shell. Labels required on current helmets contain the letters "DOT" and "FMVSS No. 218 certified" and include the manufacturer name and/or brand and the model designation (see *Status Report*, July 19, 2011). Certified helmets made before May 13, 2013, had labels, too, but they simply contained the letters "DOT." To pass off a novelty helmet as legal, riders could buy counterfeit versions of these decals and affix them to their helmet.

The stricter labeling requirements that took effect two years ago were supposed to make it harder for motorcyclists to evade the law, but that hasn't been the case so far, NHTSA concedes.

That's because the old counterfeit DOT stickers remain in circulation, and older helmets are grandfathered under current law. The decals are easy to find on Amazon.com and other online vendors, who claim that the "replacement" labels are for helmets that are already DOT approved. If questioned, riders can assert that their helmet predates the 2013 label change. That's where the proposed preliminary screening criteria would help.

Regulators believe that current DOT-compliant helmets will meet the new screening criteria. Allowing for advances in materials and technologies, NHTSA would provide for an alternative compliance process for manufacturers whose helmets don't comply with the proposed dimension and compression requirements but do meet FMVSS No. 218 performance requirements. ■



Daimler Trucks North America

Truck tractors, large buses will get ESC under new rule

Large trucks and buses soon will be equipped with the same technology that has slashed rollover crashes in passenger vehicles, thanks to a new federal requirement for electronic stability control (ESC) on heavy vehicles.

The rule, which was finalized in June, takes effect for almost all new truck tractors in 2017 and in 2018 for new buses larger than 33,000 pounds. The remaining types of truck tractors, as well as buses between 26,000 and 33,000 pounds, have until 2019.

The National Highway Traffic Safety Administration (NHTSA) estimates the requirement will prevent up to 1,759 crashes, 649 injuries and 49 deaths each year. An earlier analysis by the Institute found that ESC on tractor-trailers could potentially prevent 295 fatal crashes a year, assuming the technology was 100 percent effective. Looking at all large trucks, not just tractor-trailers, ESC would be relevant to 439 fatal crashes (see *Status Report*, May 20, 2010, at ihs.org).

"ESC has been saving lives of passenger vehicle occupants for years," says Anne McCartt, IIHS senior vice president for research. "Now this regulation will allow more road users to benefit from it."

Institute studies have found that ESC on cars and SUVs reduces fatal single-vehicle crash risk by 49 percent and fatal multiple-vehicle crash risk by 20 percent (see *Status Report*, June 19, 2010).

ESC is one of two types of stability control available for heavy vehicles. The other

is roll stability control. NHTSA chose to mandate ESC, which is more expensive but also more effective than roll stability control. Both systems can intervene if lateral acceleration and wheel speed indicate a high rollover risk, but only ESC measures the tractor's directional stability. As a result, it can intervene in a broader array of crashes, including some that involve loss of control but not rolling over (see *Status Report*, Aug. 14, 2012).

NHTSA estimates that ESC on large trucks and buses can reduce "untripped" rollovers — those that aren't precipitated by striking something or driving onto soft soil — by 40 to 56 percent. Loss-of-control crashes caused by severe oversteer or understeer can be cut by 14 percent, the agency says.

Without the new regulation, NHTSA estimates that 34 percent of truck tractors and 80 percent of large buses would have had ESC by 2018, while an additional 21 percent of truck tractors would have had roll stability control. Its estimate of the rule's impact is based on the difference between those numbers and having 100 percent of the vehicles equipped with ESC.

Compliance with the requirement will be tested using a "J-turn" test that replicates a curved highway off-ramp.

The rule doesn't cover single-unit trucks, which were involved in 35 percent of all fatal truck crashes in 2013. NHTSA is studying the feasibility and potential benefits of requiring ESC for them. ■

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