

STATUS REPORT

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

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ARE AFTERMARKET PARTS AS SAFE AS ORIGINAL EQUIPMENT?

That's the question many consumers ask at the collision repair shop. Aftermarket parts are easier on the wallet, but debate has swirled for years over whether these third-party components are comparable to ones straight from automakers. For things like fenders, grilles, and bumper covers, the issues are mainly cosmetic — fit, finish, and wear. These parts don't affect vehicle strength in a collision and are irrelevant to crash safety, as the Institute



demonstrated in crash tests as long ago as 1987 (see *Status Report*, Nov. 21, 1987; on the web at iihs.org). Some parts, like bumpers, do provide structural strength. Neglecting to build them to the same specifications as original equipment could affect how much damage occurs in a crash or how well occupants are protected. New Institute tests point to the need for these repair parts to be certified as good copies of the originals, so consumers can buy with confidence.

The Certified Automotive Parts Association (CAPA) has been working on the issue and has just released a certification standard, CAPA 501, for aftermarket bumpers. The aim is to ensure that aftermarket copies match the dimensions, material, and construction of automaker-supplied parts. Until now, CAPA has focused on setting quality standards for cosmetic aftermarket parts, lights, and hoods. Prompted by requests from its members, including many insurers, the association is extending its certification program to include structural parts.

The Institute agreed to help demonstrate CAPA's new standard by testing 3 vehicles fitted with aftermarket bumper beams. A beam that conforms to CAPA's requirements performed the same as original equipment, while 2 other aftermarket bumpers had somewhat different outcomes.

Dodge Ram results:

Engineers crash tested a 2008 Dodge Ram 1500 pickup fitted with an aftermarket bumper that meets the material, dimensional, strength, and vehicle fit requirements of CAPA's standard in a 5 mph full frontal test, plus a 40 mph offset frontal test, and then compared the performance with the same model fitted with a Dodge bumper. Results for both of the pickups were nearly identical. The low-speed damage estimate came to \$1,120 for each pickup. Likewise, in the high-speed test both models had similar crashworthiness measures.

"This is what we expected," says Adrian Lund, the Institute's president. "It shows that aftermarket parts can be reverse-engineered without compromising safety. An aftermarket bumper that meets CAPA's new standard should perform as well as the original."

The Institute also crash tested 2 vehicles fitted with front bumper beams that don't meet CAPA's standard. A 2009 Toyota Camry with an aftermarket bumper that CAPA tests showed to be stronger than the original had similar estimated repair costs in the low-speed test as a Camry with a Toyota bumper (\$804 vs. \$792). But the failure

modes were quite different. The Toyota bumper buckled at its center, resulting in damage to the bumper cover as the outboard edges of the bumper pivoted forward during the test. The aftermarket bumper didn't buckle, and as a result crushed the ends of the bumper support structure.

"The aftermarket bumper bar is thicker and heavier than the original," Lund observes. "That's not a good thing from a safety standpoint. Aftermarket bumpers need to perform (*continues on p.6*)





2008 Dodge Ram 1500 with Dodge bumper

BUMPERS CAN MATCH ORIGINAL EQUIPMENT BUT SOME MISS MARK

Aftermarket bumpers may look the same out of the box as ones supplied by automakers, but tests show not all perform the same as original equipment. The Institute crash tested a 2008 Dodge Ram 1500 outfitted with an aftermarket bumper that meets CAPA's requirements in a 40 mph offset frontal test, then compared it with a Ram with a Dodge bumper. Both pickups had similar crashworthiness measures and damage patterns, showing that aftermarket parts can be reverse-engineered without affecting safety. On the other hand, in 5 mph tests comparing an aftermarket bumper that doesn't meet CAPA's requirements on a Toyota Camry with a Toyota-made bumper on another Camry, there were clear differences. The center of the Toyota bumper buckled. The stronger aftermarket bumper didn't buckle, and as a result the bumper frame ends crushed. Small changes in design can skew airbag sensors and alter vehicle damage patterns.



2008 Dodge Ram 1500 with aftermarket bumper



2009 Toyota Camry with aftermarket bumper



2009 Toyota Camry with Toyota bumper

INDIANA CITY TAKES ROUNDABOUT PATH TO SAFER ROADS

Carmel, Indiana, is a rapidly growing, prosperous community outside Indianapolis known for good schools, abundant shopping, and a vibrant arts scene. But one basic element of urban infrastructure is scarce in the city: traffic lights.

This is no accident. If Mayor James Brainard could rid Carmel completely of the darned things, he probably would. His preferred type of intersection is a roundabout, and he says Carmel has more of them than any other US city.

Brainard credits roundabouts with keeping the number of traffic injuries from growing along with the city's road network. In 2003, there were 252 crashes causing injury on 220 miles of roads, according to Carmel officials. By 2008, the city had 395 road miles, but injury crashes went down slightly to 223. More than 2 dozen roundabouts

opened in Carmel in the intervening years. By the end of 2010, the number of city-built roundabouts is expected to reach 55, including 6 roundabout-style interchanges just completed in September along the busy Keystone Parkway. Approximately a dozen more have been built by developers of residential neighborhoods. In contrast, traffic lights number a mere 41.

Carmel will get a chance to show off its roundabouts in May, when it hosts the Transportation Research Board's International Roundabout Conference.

"There are a huge number of roundabouts to see, and they come in different configurations," says the research board's transportation safety coordinator, Richard F. Pain, explaining the group's choice of Carmel to host the conference. "They're very, very clever in some of the designs. They take the concept of the roundabout, and they make it fit."

Roundabouts, which were developed in the 1960s in the United Kingdom and are common in much of Europe, used to be rare in the United States. However, the advan-

tages they hold in terms of safety, congestion mitigation, monetary savings, and aesthetics are making them increasingly popular here. Much smaller than traffic circles, or rotaries, they force drivers to slow down to negotiate tight curves. Vehicles entering a roundabout are required to yield to traffic already in the circle (see *Status Report*, Nov. 19, 2005; on the web at ihs.org).

Roundabouts essentially eliminate the potential for the most dangerous types of crashes — right-angle, left-turn, and head-on collisions — because traffic moves in



KEYSTONE PROJECT MELTS TWO TRAFFIC ENGINEERING STRATEGIES

Carmel's success with roundabouts, including one at Main Street and 4th Avenue in Old Town (right), emboldened the city to take on the ambitious Keystone Parkway project. Unsatisfied with the state's plan to add lanes to ease roadway congestion, Carmel reached an agreement with the Indiana Department of Transportation to assume ownership of the road. The city's modifications involved lowering Keystone and building roundabout interchanges connecting the exit lanes and the cross streets. The interchanges are shaped like double teardrops (above) rather than circles. City officials believe the grade separation combined with the roundabout interchanges will improve safety and shorten commute times.

a single direction. Compared with traffic signals, they also reduce the likelihood of rear-end crashes because no one speeds up to make a yellow or green light or abruptly stops because a signal turned red.

The crashes that do occur at roundabouts generally are not severe because vehicles move more slowly than they do at conventional intersections. A 2001 Institute study of 23 intersections in the United States found that converting intersections from traffic signals or stop signs to roundabouts reduced injury crashes by 80 percent and all crashes by 40 percent.

Beginning in the 1990s, Carmel's rapid population growth — from 25,000 in 1990 to about 70,000 today — forced the city to convert many of its 4-way stops to something better at managing high traffic volumes. The obvious answer would have been stop lights, but Brainard, who had spent time in England years before, asked the city's engineering consultants to design a roundabout.

"They didn't want to do that because they were confusing modern roundabouts with the old rotaries," which are generally considered confusing and don't have the same safety benefits, the mayor recalls. So he went to Purdue University's engineering library and brought back journal articles on roundabouts to the engineers. They agreed to give it a try, and Carmel's first roundabout opened in 1997.

Carmel has learned a lot since those early days. Back then, the US Department of Transportation didn't have any specifications for roundabouts.

"We used the Australian roundabout specifications, just flipping them over," since Australians drive on the left side of the road, Brainard recalls. "It really wasn't what we needed."

This year, 2 of Carmel's early roundabouts were rebuilt according to the city's current standards. Drivers now enter the roundabouts at sharper angles, forcing them to slow even more. The slower speeds are not only safer, they also create bigger gaps

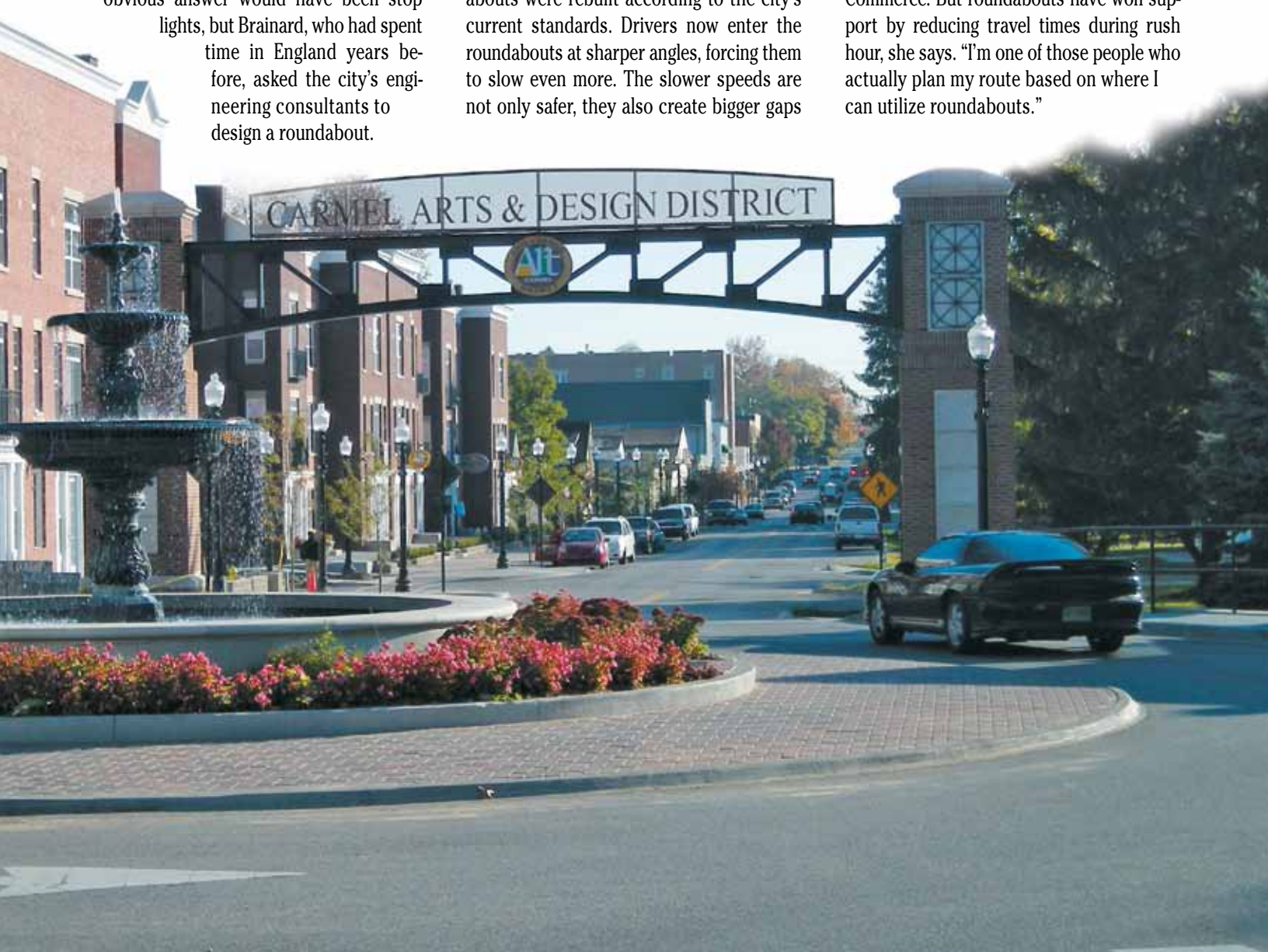
between vehicles for other vehicles to enter, thus improving the traffic flow.

Brainard says that in the city's experience roundabouts are invariably cheaper to build than intersections with signals. There's no initial purchase of signal equipment and no need to inspect and calibrate it as the years go by.

"We've landscaped the middle of our roundabouts in most cases, and it helps property values in the area," Brainard adds. "It's better to have a beautiful flower urn out there in the middle of a circle than blinking lights outside your bedroom window."

If there was skepticism on the part of drivers at first, Carmel's residents today are largely pleased with their roundabouts, Brainard says.

"Change is scary to people," says Mo Merhoff, president of the Carmel Chamber of Commerce. But roundabouts have won support by reducing travel times during rush hour, she says. "I'm one of those people who actually plan my route based on where I can utilize roundabouts."



(continued from p. 2) exactly the same as original bumpers in a crash. Even small changes in design can skew airbag sensors and alter vehicle damage patterns.”

A low-speed test of a 2005 Ford F-150 with an aftermarket bumper that doesn't meet CAPA's standard had lower estimated repair costs than a test with the stronger dealer re-



LOW-SPEED BUMPER TEST

Estimated repair costs for a Ford F-150 with an aftermarket bumper (above) that doesn't meet CAPA's requirements were lower than for an F-150 with a Ford-supplied bumper (top) in the 5 mph barrier test. That may seem like a positive outcome, but it isn't. Manufacturers of aftermarket structural parts should reverse-engineer bumper beams to match original equipment and not attempt to make them better or worse.

placement bumper (\$1,777 vs. \$1,909). That's because fog lamp recesses in the aftermarket bumper were wider than the original and shielded the lights from damage in the test.

Lower repair costs don't mean the aftermarket bumper is preferable.

“There's a difference between reverse-engineering an aftermarket part to the original specifications and re-engineering one,” Lund explains. “You don't want to make it better or worse. You want to make it the same.”

Why parts integrity matters: How structural parts are designed and produced can affect crashworthiness because these parts make up the front-end crush zone and safety cage. The crush zone absorbs crash energy, and the safety cage helps protect occupants by limiting intrusion.

Automakers typically use high-strength steel when building the passenger compartment and bumpers. On the other hand, aftermarket suppliers can cut costs by using weaker grade steel or substituting polystyrene foam for the high-impact polypropylene foam automakers use.

In turn, the collision market is a hodgepodge of domestic and overseas suppliers who build structural parts to their own internal guidelines, so there's no guarantee the parts are equivalent to original equipment in terms of quality and safety. This has long concerned some repair shops and consumer advocates, but the issue hasn't gotten much attention outside the industry.

Igniting debate: The tipping point came late last year when Toby Chess, a national director with the Society of Collision Repair Specialists, took a reciprocating saw to a copycat bumper beam and easily cut through the steel during a trade show. Earlier he'd unsuccessfully tried to cut an original equipment beam. The industry took notice, with many insiders sounding the call for tests and certification of aftermarket structural parts.

Ford fanned the debate this summer when it shared results of internal evaluations of aftermarket structural parts. The findings, covered in *Consumer Reports*, raised questions about the performance of bumper beams, isolators, brackets, and radiator supports

on the Focus, Mustang, and F-150. Ford's computer-simulated crash tests revealed potential problems with airbag timing in Mustangs and F-150s that were fitted with aftermarket components.

Consumer Reports warned owners against giving repair shops the green light to replace structural parts with aftermarket ones.

Consumers are right to be cautious, Lund says, because it's clear that structural aftermarket parts must be exactly copied to be sure they'll work properly in a crash.

“Aftermarket structural parts shouldn't change how a vehicle performs in a crash test,” he says. “CAPA's new bumper standard is a step in the right direction, and we hope the group's work will quickly extend to other vehicle parts.”

The use of aftermarket parts is growing, though parts from original-equipment manufacturers still predominate. In dollar terms per appraisal, aftermarket use rose from 11 percent in the 4th quarter of 2007 to 13 percent in this year's 2nd quarter, according to Mitchell Collision Repair Industry data.

Role of cosmetic parts: Often called crash parts, cosmetic parts include fenders, quarter panels, door skins, bumper covers, and the like. The source of cosmetic parts is irrelevant to safety because the parts themselves serve no safety or structural function. They don't affect how a vehicle holds up in a crash. They merely cover a car like a skin.

This was proved in a series of crash tests by the Institute and United Kingdom-based Thatcham (see *Status Report*, Feb. 19, 2000; on the web at iihs.org). An Institute test in 2000 involved a 1997 Toyota Camry without its front bumper cover, fenders, front door skins, and other cosmetic parts but with an aftermarket hood. In a test into a deformable barrier at 40 mph, the Camry had the same structural performance and dummy measures as a Camry with original-equipment parts. In 1987, an Institute 30 mph rigid barrier test of a 1987 Ford Escort with an aftermarket hood and without cosmetic parts showed the Escort met all US crash standards. Thatcham had similar results in 1995 in a 30 mph front-into-rigid-barrier test of a 1995 Vauxhall Astra without cosmetic parts.

CRASH DEATHS CONTINUE TO DECLINE IN US AMID RECESSION

Traffic deaths have fallen to their lowest levels since 1950, according to recently released federal data, but it's unclear how much of the drop is a temporary effect of the down economy and how much is the result of lasting safety improvements.

The data from the National Highway Traffic Safety Administration show fatalities fell nearly 10 percent to 33,808 in 2009. The estimated number of injured people fell by more than 5 percent to 2.2 million. Total police-reported crashes also were down 5 percent from 2008.

Early projections indicate the trend has continued. The agency estimates that fatalities fell another 9 percent during the first half of this year to 14,996.

"Vehicles today are better than ever at protecting occupants in a crash, and electronic

stability control, which can avert a crash altogether, is no longer a rarity," says Anne McCartt, Institute senior vice president for research. "At the same time, we don't know how big a role the current economic downturn is playing or what will happen with the numbers after the economy picks up again."

The number of miles driven in the United States in 2009 is estimated to have inched up 0.2 percent compared with 2008, when it fell for the first time since 1980. But that statistic doesn't take into account what kind of trips people took or who was doing the driving. For example, driving to and from a restaurant in the evening — something people do less often in a recession — might be more dangerous than the daily commute. And teenagers, who are more likely than

adults to crash, may be spending less time behind the wheel if they can't find jobs.

The 2009 data from the Fatality Analysis Reporting System and the early estimate of January to June 2010 fatalities are available online at nhtsa.gov.

OTHER 2009 HIGHLIGHTS

- **Motorcycle fatalities dropped 16 percent, following 11 straight years of increases.**
- **Large-truck occupants experienced the biggest decline in deaths — 26 percent.**
- **Deaths involving alcohol-impaired driving decreased 7 percent to 10,839.**
- **Passenger vehicle occupant deaths fell 8 percent to 23,437.**
- **Overall fatalities fell in 41 states and DC.**



LARGE 15-PASSENGER VANS ARE SUBJECT OF SAFETY ADVISORY

Two deadly crashes involving 15-passenger vans have prompted federal officials to remind drivers of the safety considerations that go with operating these large vehicles.

The National Highway Traffic Safety Administration warns operators to check tire wear and pressure before every trip. Owners should make sure drivers are trained to

operate these large vans, which churches and other nonprofit groups often use. All occupants should use safety belts.

Four people died and 15 others were injured in October when a church van, a 1987 Dodge Ram Wagon, blew a tire and rolled over on a Georgia highway. In September, 6 members of a Bronx church died and 8 were

injured in a single-vehicle rollover crash on the New York State Thruway when their 1997 Ford Econoline van's rear tire ruptured.

Fifteen-passenger vans have high centers of gravity, so they're less stable than cars and harder to maneuver. These vans become increasingly difficult to handle and less stable the more people and cargo they carry.

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NOW PLAYING ON YOUTUBE: INSTITUTE CRASH TESTS

The Institute's YouTube channel features more than 500 crash tests and 50-plus videos on research and consumer education topics at www.youtube.com/iihs. Playlists organized by subject and topic make it easy to find the latest **TOP SAFETY PICK** news.



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