



Using lightweight plastic to lower the center of gravity can help increase stability and decrease rollover tendency

plastics & autos

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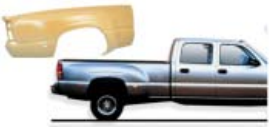
- Rollover accidents account for 33% of all passenger vehicle fatalities.¹
- Reducing the weight of a vehicle above its center of gravity, which can be accomplished through the use of plastic components such as spoilers, shelf panels, intake manifolds, fenders, and truck boxes can increase vehicle rollover resistance.² (Also see “Additional Information”)
- Taller, narrower vehicles like SUVs, pickups, and vans, have a higher centers of gravity, which can make them more top heavy and susceptible to rollover if involved in a single-vehicle crash.³ Lightweighting the top of a vehicle lowers its center of gravity, which can effectively decrease the risk of rollover.
- “Weight reduction may also tend to decrease the number of fatalities in principal rollover crashes by potentially tending to increase the roof crush resistance, relative to the curb weight.”²
- According to a 2005 study, a 100 lb. curb weight reduction in vehicles involved in rollover fatalities in 1999 could have saved almost 10% of lives lost in rollover accidents that year.²



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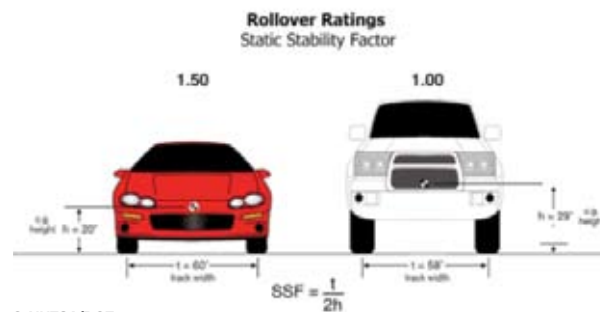
The 2005 Mazda RX-8, which includes plastic body panels among its lightweight components, has a curb weight of 3,003 lbs. and an SSF of 1.59. It received a 7% chance of rollover rating from NHTSA—the best awarded in 2005.

Additional Information

- Plastic components can lightweight the tops of a vehicle, effectively helping to lower the center of gravity and reducing the risk of rollover accidents.⁴
- Structural composite spoiler, 2001 Chevy Monte Carlo Pace Car: 3 lbs.
- Plastic blow molded shelf panel, 2001 Chrysler PT Cruiser: 4 lbs.
- Plastic 3.8 liter intake manifold, 1996 Ford Windstar: 5 lbs.
- Dually Pickup Fender, 2000 GM C/K Truck: 30 lbs. per fender → 
- Composite truck box, 2002 Chevy Silverado: 50 lbs. per vehicle
- More than 10,000 people a year are killed in rollover crashes [worldwide].¹
- “Vehicle rollover crashes are especially serious because they so often result in head injuries. Head trauma is the most frequent type of fatal and nonfatal injury in rollovers.”⁵
- A vehicle’s Static Stability Factor (SSF) is calculated by dividing the track width by the height of the center of gravity times two (see diagram below).⁶
- The higher the SSF number, the more stable, less top-heavy the vehicle, and the less likely the vehicle will roll over in a single-vehicle crash. SSF values range from 1.00 to 1.50, with most passenger cars holding values in the 1.30 to 1.50 range, and higher riding SUVs, pick-ups, and vans in the 1.00 to 1.30 range.⁶



Source: The Star Foundation, A National Heritage Foundation Organization.



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Source: IIHS

When the weight above the center of gravity becomes too great rollovers can occur more easily.

One of the major dangers of vehicle rollovers is the risk of severe head injury.

Works Cited

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- 2 Van Auken, R.M and J.W. Zellner. Supplemental Results on the Independent Effects of Curb Weight, Wheelbase, and Track on Fatality Risk in 1995-1998 Model Year Passenger Cars and 1985-1997 Model Year LTVs. Torrance, CA: Dynamic Research, Inc., May 2005.
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- 4 American Plastics Council. Automotive Learning Center. Plastics: Your Key to Fuel and Cost Savings. Arlington, VA: American Plastics Council, 2001. A brochure. Available at http://www.plastics-car.com/fuel_economy/Default.html (accessed April 28, 2005).
- 5 Advocates for Highway and Auto Safety. "Fact Sheet: Rollover." Advocates for Highway and Auto Safety. <http://www.saferoads.org/issues/fs-rollover.htm> (accessed April, 20, 2005) Citing NHTSA.
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Pictures

2005 Mazda RX-8: <http://www.researchnewcars.com/CarModel.aspx?modelnumber=2504&modelName=2005%20Mazda%20RX-8&Make=Mazda>

Rollover Test: <http://www.sicurauto-video.it/speciali/rollover/index.php>

Rollover Compare: www.safercar.gov/rollover/pages/FAQs.htm © NHTSA/DOT

Rollover Crash 1: http://www.womanmotorist.com/images/articles/Safety/sr4101_Crash.jpg

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