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Crash!

by David L. Wheeler

On an abandoned airplane runway in Texas, a pickup truck going more than 60 miles an hour slams into a metal fence. The truck swerves to one side, spraying up a cloud of dirt. Still moving, it slides along a curve created by the bent fence, bounces away, and then bumps into the fence one more time. Finally, it comes to a stop.

Luckily, no one was actually driving the pickup. It was pulled into the fence by another truck as part of a crash test of a guardrail, one of the safety fences that line the sides of roads. Engineers conduct crash tests of guardrails to learn how to help cars come to a safe stop if they go off the road.

Safety experts would prefer that nothing stuck up out of the ground for at least 30 feet from the edge of any road. Then drivers who go off the road because the road is wet or icy or because they're tired or drunk could coast to a safe stop. But roads are often built near dangers, such as cliffs, trees, or even traffic lights.

Looking Back From 2007: The Story Behind "Crash!"

When I suggested this article, my fellow editors thought the topic was too geeky even for *Muse*. But I was hooked. I found it fascinating that the design of a guardrail varied with the job it had to do. If you knew this, you could read a secret highway code everyone else missed. In the end, we agreed to run the article with a humor piece making fun of it. Now, looking back after nine years, I consider "Crash!" a kind of touchstone for *Muse*-worthiness. If you can see that guardrails are interesting and laugh at yourself for finding guardrails interesting, then *Muse* is the magazine for you.

—Diana Lutz

To see some cool films of crash tests, check out www.hwysafety.org/news.htm

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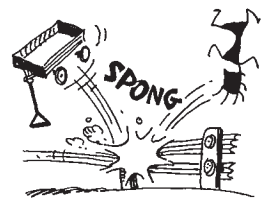
A guardrail crash test in progress.

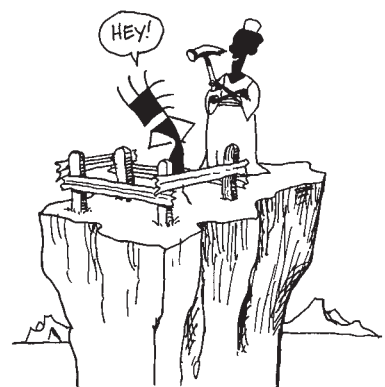
When highway designers can't keep the roadside clear, they wrap a guardrail around any dangerous obstacle. If a car leaves the road, the guardrail absorbs the energy of the car's motion. How it does that depends on its design. In the pickup crash test, the guardrail was a type called a strong-post W-beam. Each post of the guardrail had a long steel rail bolted to it, and each rail overlapped the next one. When the pickup hit the fence, the rails worked together like a rubber band. The rails bent backwards, and the W-shape built into the rails collapsed. The posts pushed back in the dirt, and some of them broke off. Because some of the pickup's energy was absorbed by bending metal and snapping posts, the truck stopped much sooner than it otherwise would have.



Even though guardrails help prevent some fatal accidents, roughly a million people a year are hurt in accidents that involve a car, a truck, or a motorcycle going off the road. As a result, engineers who design roadsides feel that they still have a lot of work to do.

Roger Bligh, an engineer at the Texas Transportation Institute, the largest transportation-safety research center in the United States, tests guardrails. In his tests, Bligh and the engineers who work with him are so careful that they measure not only how hard the dirt is packed around the posts but also how wet it is. This is important, because the nature of the dirt affects how the posts move in a crash.

Inside the cars that are used in crash tests, engineers install instruments that tell them what would happen to passengers in the car. For example, they can find out how fast the passengers' bodies would be going when they hit the dashboard or doors. Then the



engineers can get an idea if someone might get hurt in a collision.

During a test, Bligh also makes sure that the car or truck doesn't go over, under, or through a guardrail. He prefers that the car or truck stay near the guardrail after colliding with it, instead of bouncing back into the road where other cars might hit it. He also wants to make sure that a car or truck doesn't roll over on its side or roof, since that would increase the chance that passengers would be injured.

Engineers try to make guardrails safe for collisions with as many different kinds of cars and trucks as possible, but that's hard to do. When your parents were kids, most of the cars on American highways were big four-door family cars. But now many different kinds of vehicles are on the road. A good guardrail should be able to absorb the energy of a tall, heavy pickup truck or a short, light car, and steer both of them to a safe stop.

Another problem engineers face is how to end a guardrail. If the last post of a guardrail is near the road, the post can slice through the front of a car and the rail can spear the windshield. To prevent this, the ends of guardrails are curved away from the road, or designed to crumple slowly, or wrapped in *crash cushions* (such as barrels filled with sand) that act like pillows and soften the crash.

In the test described at the beginning of this story, the truck ended up with a flat tire and a badly crumpled fender. But it didn't roll over, and if people had been inside and were wearing their seat belts, they probably wouldn't have been seriously hurt. Thanks to the test, Bligh now knows that if this guardrail was used on a real road, it would save lives.

David L. Wheeler is the managing editor of the Chronicle of Higher Education.

An overhead view of the same test.