The sound of an airbag deploying is loud, like the cracking of a whip. Really, it’s the noise of an explosion.

When car sensors detect a crash, a chemical reaction is triggered by the ignition of a solid hunk of propellant. The way propellant works in an airbag...
comes down to heat, moisture, and timing. A wad of chemicals sits inside a flattened metal canister until heated up—which makes those chemicals expand quickly and gaseously when the airbag needs to inflate. Vents on the back of the bag prevent the whole thing from being blown to bits. All this happens in about half the time it takes for a person to blink: between 100 and 200 milliseconds.

That’s how it’s supposed to work, anyway.

But as many as one in seven cars on the roads in the United States may have defective airbags. That’s the scope of the ongoing automotive recall that includes 34 million cars—Toyota, Nissan, Honda, Mazda, Mitsubishi, General Motors, Subaru, Ford, Chrysler, and BMW are all affected. The defective Takata-made airbags explode with shrapnel, spraying motorists with sharp bits of metal, and have caused more than 100 injuries and at least eight deaths in the past decade.

The faulty airbags are being traced back to the chemical compound Takata now uses for propellant. The manufacturer changed the main ingredient from tetrazole to ammonium nitrate in 2001. Takata has defended its continued use of the latter, calling it “safe and effective for use in airbag inflators when properly engineered and manufactured,” in a statement. But employee emails show that there were “dire warnings about safety and quality lapses years before Takata Corp. would fully acknowledge the threat posed by its defective airbags,” according to a report by the Senate Commerce Committee this week. Senator Bill Nelson, a Floridan Democrat, says it now appears that Takata was aware of “serious safety and quality control lapses” in its factories as early as 2001.

Ammonium nitrate can expand rapidly as a gas without exploding, but it can also explode violently. It’s pretty unstable, too, which means it can—and often does—blow up when it isn't supposed to. It’s cheap, which makes it
desirable to manufacturers, but it’s unpredictable.

“And it’s not regulated at all as a propellant,” said Byron Bloch, a car-design consultant and long-time advocate for automotive-safety technologies. “The manufacturer of the airbag has their own selection of the chemistry. There are no guidelines that say you have to take this mixture and subject it to temperature cycling or moisture cycling. You don’t have to get pre-approval for the chemical you’re using. And the chemistry of the propellant is not monitored in any way. So once you make it, and you hope it’s sealed properly, you have no clue what’s happening, chemically, to the propellant after five years, 10 years, 15 years.”

There are now several testing consortia—in collaboration with the National Highway Traffic Safety Administration—evaluating the stability of using ammonium nitrate for propellant. The U.S. Transportation secretary said in February it would fine Takata $14,000 per day until the airbag manufacturer, the world’s largest, complied with federal inquiries about its designs.

* * *

It was still a radical idea in 1970: A new car-safety system built around a rapidly inflating bag that would automatically cushion passengers when they pitched forward in a crash. The annual death toll in the United States at the time was approaching 60,000 per year, and the auto industry was eager to show off its new technology.

Only, it didn’t really work. At least not when the carmaker Ford tried to demonstrate its airbags to lawmakers in Washington, The New York Times reported in 1970. Motorists weren’t exactly clamoring for the devices, either. Many people still didn’t wear seat belts in those days.

There were also concerns that airbags would inadvertently inflate. “The air
“The technology was canceled not for valid technological reasons, but because the corporations didn’t want it.”

For Bloch, the Takata recall represents the latest chapter in a decades-long obsession with automotive safety that has been characterized by more setbacks than victories. The auto industry, since the beginning of America’s obsession with the open road, has been reluctant to incorporate new safety technologies into its cars. “The airbag became one of my passions, but the concept was so unusual in the late 1960s,” he told me. “There was a bit of ‘gee-whiz’ about it, particularly when they were first being talked about.”

Today, with Takata in the news, American auto manufacturers are avoiding speaking publicly about how they’re thinking about—or perhaps rethinking—airbag design. Several automakers declined repeated requests for interviews.

“The history is long and fragmented and has lots of ups and downs and starts and stops,” said Roger White, a historian of road vehicles and technologies at the Smithsonian’s Museum of American History. “The impetus for bringing change to automobile interiors came from individuals, whereas automakers took a passing interest in auto safety.”

One of those individuals was Claire Straith, a plastic surgeon whose patients were often the survivors of horrific car crashes in the 1920s and 1930s. “Straith began taking a camera to the crash site to photograph the wreckage,” wrote Maria Kovac in an article about Straith for Hour Detroit Magazine. “He looked for clues to what specifically caused the patient’s injuries. He focused his attention, and his camera, on the metal dashboards and protruding
Straith began sharing his photographs with nearby automakers in Detroit, and called press conferences so he could publicize the brutal injuries people sustained from the interiors of their cars. “He said, ‘Not only do you have steel dashboard, you’ve got metal knobs that are hitting people,’” White told me. “He had a gory slideshow that he would take around to places and he would show the imprint of heater grills and radio speakers and all these things that struck people’s faces.”

Straith made and distributed homemade dashboard pads, and he installed seat belts in his own cars decades before the federal government required manufacturers to do so. His focus on automotive safety was rare, and it wasn’t just car makers who had to be convinced to improve their designs. “It's also true that motorists had generally been apathetic about safety devices until recent decades,” White said. “The impetus [for better safety] was not coming from motorists. A lot of people associated seat belts with reckless driving like stunt drivers.”
The federal government began requiring cars to come with seat belts in 1968. By the early 1990s, most states—New Hampshire remains the notable exception—began requiring drivers and passengers to wear them. And for good reason: Wearing a seat belt reduces serious injuries and deaths in car crashes by half, according to the Centers for Disease Control. But even with enforcement campaigns like “Click It or Ticket,” millions of people still choose not to buckle up regularly.

Before airbags were federally mandated in the United States in 1998, carmakers tinkered with other passive restraint systems like automatic seat belts—remember those?—that would send a shoulder strap zooming along a track toward a passenger or driver as soon as the car door closed. They were not popular. (“It came toward your throat like it was going to cut you off like a guillotine,” White said.) Chimes, buzzers, and other ding-ding-dinging alarms have attempted to bother drivers and passengers into buckling up since.

“But one reason airbags caught on was that these other things had failed,” White said. “People hated them so much, they said, ‘Okay, we'll try anything.’”

1984 public-service ad (The Museum of American History)
What people like or don’t like ends up mattering a lot when it comes to improving industry safety standards. The earliest cars outfitted with airbags came with toggle switches so people could turn them off if they wanted. And even when airbags work the way they're supposed to, they’re still safest when paired with seat-belt use.

But getting airbags and seat belts to be standard features meant safety advocates had to find their way through a political thicket, pleading with officials who often kowtowed to carmakers. “We can't have a completely safe society or safe highways or safe cars and pollution-free and so forth,” President Richard Nixon said in a 1971 meeting about auto safety with Ford executives. “Or we could have, go back and live like a bunch of damned animals.” In that meeting, Nixon agreed to put a stop to a pending bill that would have required airbags in American cars.

“How disgraceful it is,” Bloch said, “for the president of the United States to conspire with corporate leaders in the auto industry—to literally cancel live-saving technology that would have saved many thousands and thousands of lives over the years in the 1970s, 1980s and 1990s. The technology was canceled not for valid technological reasons, but because the corporations didn't want it.”

It wasn't until decades later, in the late 1980s, that the culture around car safety changed. Along with regulatory changes, there were public-service announcements. Crash-test dummies Vince and Larry starred in a series of PSA shorts about the importance of wearing seat belts. (They were popular enough that the characters were sold as action figures in the early 1990s.)
Safety became a selling point for motorists, which prompted auto manufacturers to focus on enhancing airbag technology. At the same time, stricter regulations about child and infant car seats were passed. (Those laws had to be refined repeatedly throughout the 1990s to adapt to the presence of airbags, which were blamed for dozens of deaths of infants riding in the front seats of cars.)

Which means the ubiquity of airbags represents a cultural change, White says, as much as a technological one. “I don’t think scholars have sufficiently studied that change in attitude,” he said. “It was a big change.”

But the story of airbags—the larger trajectory of automotive safety—has always been political in nature first. Where car makers and government officials have reacted to crises, lasting changes have come about because of individuals’ efforts. “Where is the pressure going to come from? Where is the advocacy?” White said. “Always the lone wolves.”

ABOUT THE AUTHOR

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