

HOW DO AIRBAGS INFLATE IN 0.03 SECONDS?

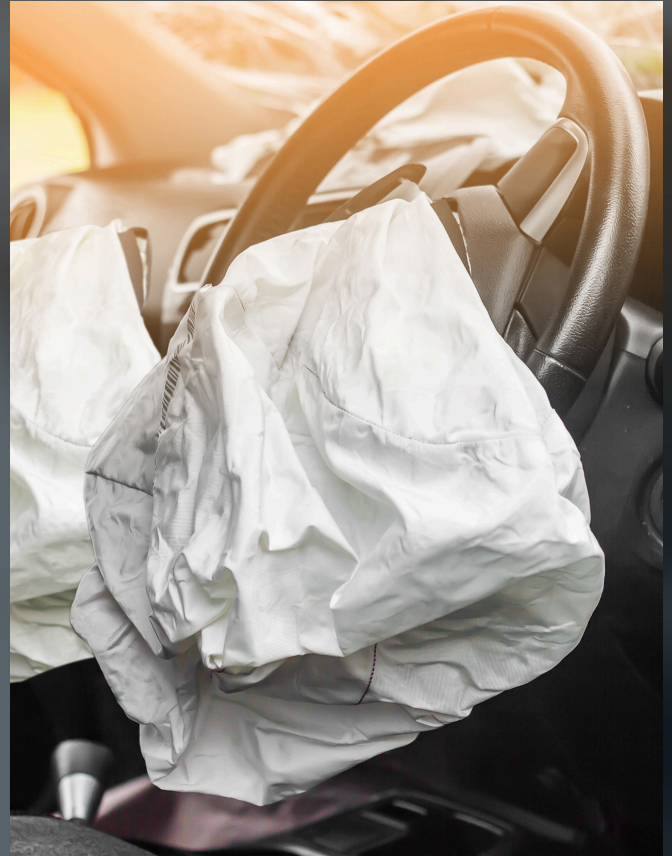
Every day, we all drive with the assurance that the airbags will keep us safe in the event of an accident.

However, have you ever thought of how American engineer John Hetrick came up with the concept of these "inflatable cushions" in 1951, and how they operate?

While driving with his family, he was involved in an accident. Thankful that his daughter sitting beside him was unharmed, he realized what might have occurred if she had slammed more strongly into the dashboard. Hetrick began to envision cushions and sponges that would offer protection in the event of an accident. A memory from his days as a Navy torpedo technician came to his mind. Compressed air powers torpedoes, and for some reason, the air is suddenly unintentionally released. One image had stuck in his mind, that of the tarpaulin, which had covered the torpedo, being launched instantly into the air! Inspired by this idea, Hetrick began his journey to develop what would later become the airbag.

Although Hetrick paved the way, other engineers and inventors went on to improve airbag technology. Since the early 1970s, when airbags were initially introduced, cars and their safety systems have advanced quickly.

The idea of airbags gained traction, but how could they be securely filled without the use of pressurized gasses within a few milliseconds of impact?



How do airbags deploy?

You should be aware that airbags are not inflated from some compressed gas source but rather from the products of a chemical reaction. Sodium azide, or NaN_3 , is the chemical that is central to the airbag reaction.

When a collision occurs, the car's crash sensors (accelerometers) send an electric signal to the software requirements specification (SRS). An airbag can be immediately inflated when the signal burns a combustible compound and the heat it produces begins to break down sodium azide, releasing nitrogen gas.

All cars manufactured after 1999 must have frontal airbags. According to data from the National Highway Traffic Safety Administration reports that in 2024, frontal airbags saved more than 50,000 lives in the United States alone!

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