NIST Bullet Tests Make Frangibles More Tangible

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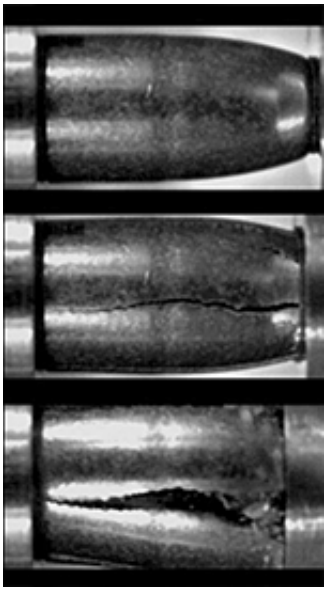

Researchers at the National Institute of Standards and Technology are measuring precisely the disintegration of “frangible” bullets when they strike a surface to better understand how the ammunition might affect body armor.

Frangible bullets, often made from sintered (formed by heat and pressure) metal powders that will break into tiny fragments, are designed to disintegrate on impact with a hard surface. They are becoming increasingly popular in situations where ricochets or “splash-back” from

bullets is not tolerable. These include firearms training facilities and crowded places such as airports, courtrooms and office buildings. Additionally, the lead-free nature of frangible bullets eliminates the risk of exposure to that hazardous substance.

While frangible bullets have distinct advantages over conventional lead and copper-clad lead bullets, their characteristics are well known only for contact with hard surfaces. The behavior of such ammunition upon impact with softer materials—like those found in the soft body armors worn by many law enforcement officers and emergency responders—has raised concerns that some protective garments may be vulnerable to certain types of frangible bullets.

Initial research to assess this risk focused on ballistic penetration tests. Now NIST researchers are using a Kolsky bar apparatus—a NIST-built, air-powered device that can measure a metal's response to the stress and strain of high-speed impacts—to document precisely what it takes for a frangible bullet to fail (or in this case, succeed, because the sintered metal's breakdown is the desired outcome).

The test samples are small slices from frangible bullets that are sandwiched in the space between the Kolsky apparatus' two hardened steel bars. An air gun situated at the far end of one bar propels a striker rod into the bar. This creates a fast-traveling disturbance called a strain wave that races down the bar at 5,000 meters per second (equivalent to 11,000 miles per hour) and compresses the sample. The wave energy transmitted through the bars can be measured to determine the strain and stress that the sample has endured.

Data derived from the NIST experiments will be used to better understand what happens when frangible bullets and body armor materials interact, and then serve as the foundation for additional bullet impact studies. Once that knowledge is in hand, the Department of

Justice will reassess the current body armor performance standard to determine if special accommodations are necessary for frangible bullets.

Source: NIST