

BALLISTICS STATISTICS

SwRI offers expertise in ballistics, hypersonics, explosion loading, structural response and scale modeling. We have developed models for:

- penetration mechanics
- shot-line and shaped-charge analyses
- exterior and interior ballistics
- specialized sabot design
- explosion hazards and debris
- blast-loaded structures

State-of-the-art instrumentation records data in severe environments down to the nanosecond range.

Testing capabilities include ballistics — small arms, long-rod projectiles, fragments and shaped charges — and dynamic loading and response of mechanical systems and structures in highly transient environments.

SwRI conducts hypersonics and other high-speed research using this unique two-stage light-gas launcher, featured here by the numbers.

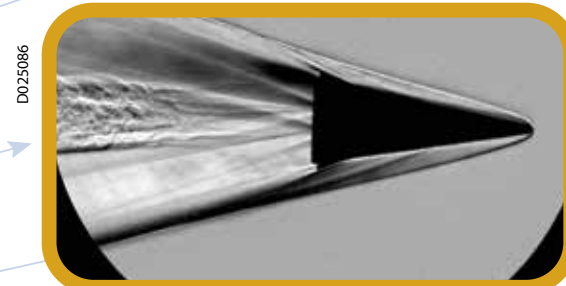
For light-gas gun testing, SwRI encases test projectiles in a sabot, a structural device used to keep smaller projectiles in the center of the barrel when fired. The sabot separates from the projectile and is stripped away when it hits an impact plate.

Gun:
72
feet
long

Number
of tests:
>500
since
2017

Flight speeds:
MACH 1.5
to **17.4**
supersonic to
hypersonic

Mach 1: Flow speeds equal
the speed of sound
Hypersonics: Flight in
excess of Mach 5



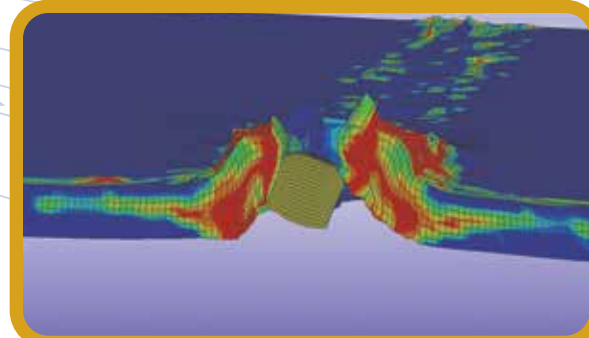
Launch
velocities:
0.5 to 6.0
km/s
(or 1,118 to
13,422 mph)

Total time
of flight:
1 to 5
milliseconds

Multiple view ports along the flight path allow high-speed imaging, including schlieren photographs that show the flow of air around the projectile.

Bore
diameter:
1.5
inches

Peak air temperature
around object flying at
Mach 16.4 (5.65 km/s):
7,100 K
(12,320 F)
Surface temperature
of the Sun: 5,778 K (9,940 F)



SwRI integrates data from experiments to develop models that simulate the effects of ballistic impact on armors and other materials.