

IMPACT DYNAMICS

The National Institute for Aviation Research (NIAR) conducts a wide range of safety-related coupon and full-scale impact testing for many applications with a variety of projectiles and test specimen material designs, such as:

- Aircraft bird strike and hailstone impact resistance
- Windborne debris
- Turbine engine fragmentation
- Pressure vessel impact and containment
- Ballistic and Impact resistant structure qualification

The Ballistics Test Facility contains a control/instrumentation room and a target room/bunker. The range is setup so that targets can be located at 25, 50, 75, and 100 feet from the gun. Adjustability is available that provides quick vertical and horizontal adjustments of the target position.

The Large Compressed Gas Gun can perform bird strike testing from 60-knot rotary-wing FAA Airworthiness Certification up to >550-knot fixed-wing USAF canopy qualification testing.

Projectiles, sabots, and target fixtures are often designed, constructed and tested at NIAR to meet a client's specific need. A suite of state-of-the-art data acquisition and computer controls supports the experimental facilities.

→ BALLISTIC TEST CAPABILITIES

- Universal Receiver capable of multiple barrels
- Rifled and smooth-bore barrels available from 22 cal to 50 cal
- U.S. and foreign ball, armor-piercing, and fragment-simulating ammunition
- Tumbling rounds for various calibers and ammunition (required for most pressure vessel specifications)
- Laser-based target alignment system
- Test fixture fabrication, machine shop and welding
- Drop tests for up to 30 ft
- Ballistic impact of materials or structure under load
- Ballistic protection and impact loading
- Test of pressure vessels and oxygen tanks
- Bonfire testing
- Environmental control of test articles
- High-speed digital video of impacts up to 500,000 frames per second
- High-speed data acquisition up to 1 MHz



NIAR

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→ LARGE COMPRESSED GAS GUN CAPABILITIES

- Launch of projectiles from 1 to 8 inches in diameter
- Impact velocities from 100 fps to over 900 fps with weights up to 12 pounds
- Environmental conditioning of test articles
- Gelatin and real bird projectile testing
- Sabot design and fabrication
- High-speed digital video of impacts up to 500,000 frames per second
- High-speed data acquisition up to 1 MHz

→ EXPERIENCE

- Shooting of various compressed gas cylinder assemblies
- Shooting of various protective structures such as mobile offices and doors

→ FACILITIES

- 25ft x 25ft x 35ft reinforced concrete containment
- Control room where clients can safely monitor all aspects of the test and record numerous streams of high speed video, pressure, temperature and strain data
- Large target impact area accommodating full-scale aircraft components, wings and fuselage sections for the compressed air cannon
- Compressed air cannon with adjustable height for up to 14 feet above-ground targeting and alignment (pitch, yaw and roll angles; various waterline and buttline impact locations)
- Located at the world renowned Aircraft Structural Test and Evaluation Center (ASTEC)

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