

# AEROPHYSICS RESEARCH FACILITY (ARF)



*Providing revolutionary weapon system research and testing to the missile defense community*

**The Aerophysics Research Facility (ARF)** consists of multiple national assets, including some of the world's largest two stage light gas guns, a wide array of single stage compressed gas guns, and a number of state of the art high speed diagnostic systems. These systems enable projectiles of varying sizes, shapes, and masses to be launched at velocities as low as 0.1 kilometers/second (km/s) to over 6 km/s. Research is supported through an in-house instrumentation and diagnostics lab, a fabrication shop, and a machine shop. State of the art diagnostic instruments include – three Pharsighted EO9 high speed video cameras (HSV's), five Photron SAZ HSV's, two Shimadzu HPVX2 HSV's, two PCO Dicam C1 Intensified cameras, four sets of 450 kilovolt (kV) dual output flash X ray (FXR), six sets of 300 kV FXRs, and numerous other data collection systems. Fabrication and machining capabilities include various computer numerical control mills (up to five axis), CNC lathes (three axis), metal inert gas/tungsten inert gas welding, and various sheet metal and woodworking tools.

- Hyper, Super, and Subsonic Aerodynamics and Impact Mechanics
- Weapon System Development/Assessment
- Lethality/Survivability Studies
- Weather Encounter Effects
- Counter Unmanned Aircraft System (UAS) and UAS Lethality Characterization
- Aircraft Collision Effects
- Ballistic Armor



*Ballistics Capabilities* – The ARF has multiple reconfigurable Single Stage Gas Guns and two active Two Stage Light Gas Guns that are capable of launching masses ranging from a few grams to multiple kilograms at velocities in excess of six km/s. Flexibility in launcher system selection enables the ARF team to tailor the design of an experiment around a specific customer's needs, with minimal requirement tradeoffs.

*Instrumentation Support* – Within the ARF's diagnostic system inventory are some of the most modern high-speed imaging and flash X ray systems and are operated by a highly experienced research staff. The ARF team has extensive experience in leveraging optical diagnostics for maximum data return and has a demonstrated history of providing novel and creative solutions to the ARF's customers, breaking new ground and capturing never before seen images and data.

*Manufacturing Support* – In addition to test services, the ARF is also able to provide customers with manufacturing support, ranging from the fabrication of impact targets to the machining of complex and custom projectiles.

*Secure Testing Environment* – Located within the boundary of Redstone Arsenal and supported by USASMDC security, the ARF provides customers with a secure environment for conducting testing up to the Secret level.

*High Throughput Testing* – While dependent upon test specific requirements, the ARF has routinely demonstrated the ability to execute large light gas gun shots weekly, small light gas gun shots biweekly, and single stage gas gun shots multiple times daily.



For more information, please contact: USASMDC Public Affairs Office

P.O. Box 1500  
Huntsville, AL 35807  
256-955-3887

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