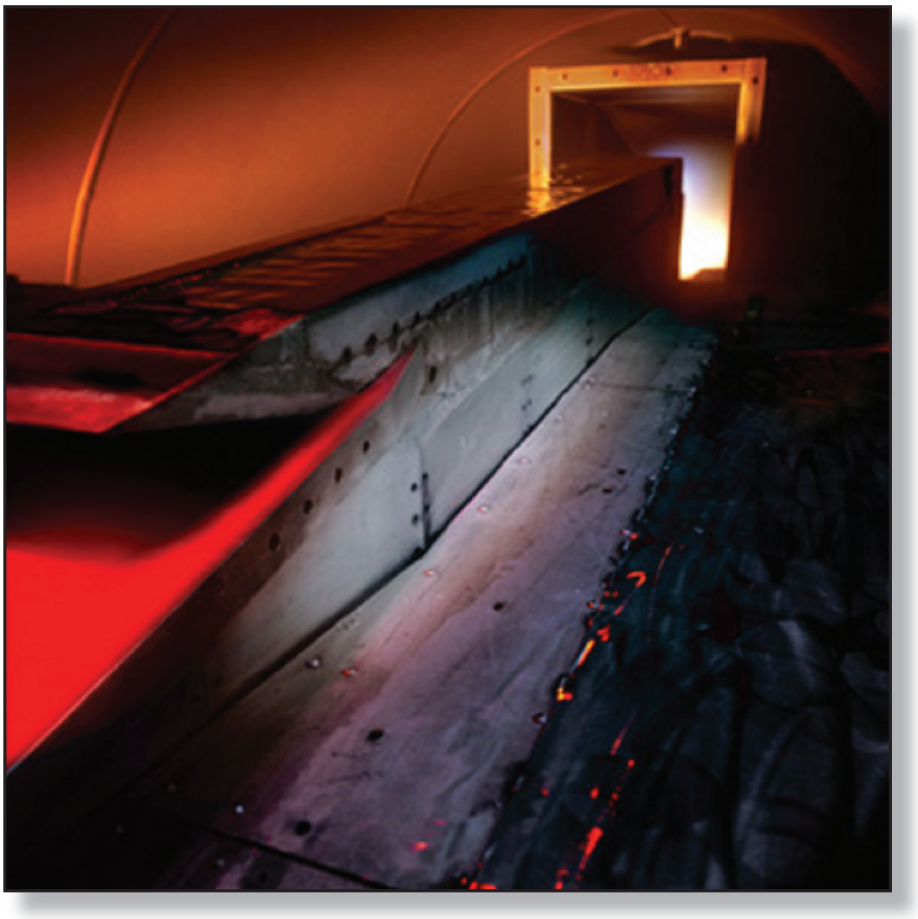
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

SCRAMJET ENGINE GROUND TESTING SUCCESSFULLY COMPLETED



Propulsion Directorate researchers completed wind tunnel testing of the world's first fuel-cooled supersonic combustion scramjet, an engine that uses conventional jet fuels to reach hypersonic speeds (speeds over Mach 5). Directorate researchers and their industry partners successfully demonstrated the operability and durability of the scramjet at two representative flight Mach numbers (Mach 4.5 and Mach 6.5).

Air Force Research Laboratory
Wright-Patterson AFB OH

Accomplishment

The directorate successfully completed freejet testing of the first-generation supersonic combustion scramjet engine, known as the ground demonstration engine (GDE-1). Testing was conducted as part of the Aerospace Propulsion Division's Hypersonic Technology (HyTech) program. GDE-1 is a flight-weight, fuel-cooled, hydrocarbon scramjet ground test engine that was designed and built by Pratt & Whitney and tested at GASL's facilities in Ronkonkoma, New York.

The next step in the development process is to design, fabricate, and test the second-generation engine known as GDE-2. Testing goals include closed-loop operation of the engine in a ground test environment. GDE-2 will be slightly larger, include a variable geometry inlet, and be regeneratively fuel-cooled during testing, meaning that the fuel used to cool the engine will also be burned in the combustor. Testing of GDE-2 will take place at the National Aeronautics and Space Administration Langley Research Center's 8-foot-high temperature tunnel.

Background

The HyTech program was started in the wake of the cancelled National Aero-Space Plane program, an effort aimed at developing a hydrogen-fueled, scramjet-powered, single-stage-to-orbit vehicle capable of aircraft-like horizontal takeoffs and landings. In contrast, the Air Force's version of the scramjet is designed to run on JP-7 fuel, a more logistically supportable fuel than hydrogen. This technology has the potential to power future hypersonic vehicles, such as cruise missiles and long-range strike and reconnaissance aircraft, at speeds up to eight times the speed of sound.

Propulsion
Emerging Technology

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (04-PR-01)