

# ADVANCED HYPERSONIC PROPULSION

Aerojet Rocketdyne manufactures a wide range of products to support hypersonics, including solid rocket motor boosters, air-breathing scramjet engines, warheads and missile defense technologies.

Scramjets burn fuel mixed with air compressed by the forward speed of the aircraft to produce thrust, which could one day enable aircraft to fly from Los Angeles to London in just over an hour.

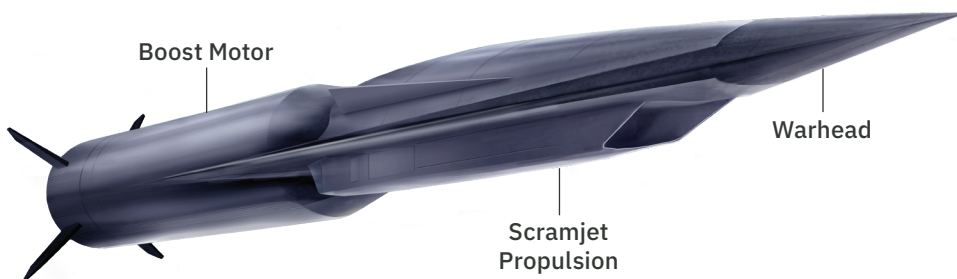
## HYPERSONICS

Aerojet Rocketdyne teamed with the United States Air Force Research Laboratory (AFRL), the Defense Advanced Research Projects Agency (DARPA), the National Aeronautics and Space Administration (NASA) and Boeing on the X-51A Scramjet Engine Demonstrator program, fully achieving the goal in 2013 to demonstrate the first practical hypersonic flight (cruise Mach >5) of a hydrocarbon-fueled and -cooled scramjet-powered cruise vehicle.

Under numerous government contracts and its own investments, Aerojet Rocketdyne has continued to improve the aerothermal performance, affordability, scalability and rapid manufacturability of scramjet engines to meet emerging needs for hypersonic missile and aircraft applications.

Aerojet Rocketdyne is also a leader in solid propellant boost motor development for weapon systems. Having been the provider of the solid boost motors that powered the X-51A to hypersonic flight success, Aerojet Rocketdyne is developing the next generation of mission critical propellants, lightweight and robust motor cases, and improved affordability that will enable US crucial hypersonic boost-cruise and boost-glide missiles for our customers.

Aerojet Rocketdyne uses extensive historical expertise in energetic materials development to craft new warhead concepts. These warhead designs adapt the high kinetic energy of hypersonic delivery systems with unique technology to enhance the focused and selective effectiveness of new energetic materials to best meet variable mission needs.



## ADDITIVE MANUFACTURING

Compared to previous Aerojet Rocketdyne scramjet engines:

- > 75% reduction in time to produce
- > 75% reduction in cost to manufacture
- > 95% reduction in number of parts enabled by greater design flexibility



## GENERAL AM PARTS

Using additive manufacturing (3D Printing) for scramjet engines optimizes performance while dramatically reducing cost and production time.

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