NASA Aeronautics – Vision for Aviation in the 21st Century

U.S. leadership for a new era of flight

ARMD continues to evolve and execute the Aeronautics Strategy
https://www.nasa.gov/aeroresearch/strategy
Research Programs Align with Strategic Thrusts

- **Airspace Operations & Safety (AOSP)**
  - Safe, Efficient Growth in Global Operations
  - In-Time System-Wide Safety Assurance

- **Advanced Air Vehicles (AAVP)**
  - Ultra-Efficient Commercial Vehicles
  - Innovation in Commercial Supersonic Aircraft
  - Transition to Alternative Propulsion and Energy

- **Integrated Aviation Systems (IASP)**
  - Flight research-oriented, integrated, system-level R&T that supports all six thrusts
  - X-planes/test environment

- **Transformative Aeronautical Concepts (TACP)**
  - High-risk, leap-frog ideas that support all six thrusts
  - Critical cross-cutting tool development
  - Assured Autonomy for Aviation Transformation
Advanced Air Vehicles Program

Cutting-edge research that will generate innovative concepts, technologies, capabilities & knowledge to enable revolutionary advances for a wide range of air vehicles.

- **Advanced Air Transport Technology Project (AATT)** Conducts fundamental research to improve aircraft performance & minimize environmental impacts from subsonic air vehicles.

- **Revolutionary Vertical Lift Technology Project (RVLT)** Develops & validates tools, technologies & concepts to overcome key barriers, including noise, efficiency, & safety for vertical lift vehicles.

- **Advanced Composites Project (AC)** Conducts research to reduce the timeline for development & certification of composite structures for aviation [Completing in early FY20].

- **Commercial Supersonics Technology Project (CST)** Develops tools & explores concepts for potential advanced capabilities & configurations for low boom supersonic aircraft.

- **Hypersonic Technology Project (HT)** Develops tools & technologies in the area of hypersonic flight.
A New Era of Flight Is Emerging

Breaking down barriers to open new markets, advance U.S. competitiveness, and make air travel better for all Americans and for people around the world

Electrified Aircraft Propulsion
*Making air travel cleaner, quieter, and more affordable*

Urban Air Mobility
*Allowing people to move about more easily*

Commercial Supersonic Flight
*Connecting people faster*

Hypersonic Flight
*Enabling a future vision for hypersonic transport*
Community Vision for Point-to-Point Hypersonic Transport

Virgin Galactic shares to triple as it disrupts airlines with hypersonic travel, Morgan Stanley says

*Morgan Stanley says Virgin Galactic’s stock will soar as it proves out a long-term plan of flying people around the world at hypersonic speeds.*

"A viable space tourism business is what you pay for today ... but a chance to disrupt the multi-trillion-dollar airline [total addressable market] is what is really likely to drive the upside," Morgan Stanley analyst Adam Jones says.

*Morgan Stanley forecast $60 billion in annual sales for hypersonic travel by 2040 and Virgin Galactic is in the early stages of exploring how the technologies it developed for space tourism might apply to hypersonic travel.*

Boeing unveils rendering of hypersonic jet that would fly from US to Japan in 3 hours

"Boeing unveiled its vision of a hypersonic jet that would fly from the US to Japan in just 3 hours. The jet would reach speeds of up to 3,000 miles per hour and could cut travel times by two-thirds."

Hermeus hypersonic jet aims to fly New York to London in 90 minutes

"Hermeus, a start-up founded by ex-Air Force engineers, has unveiled its hypersonic jet concept that could fly from New York to London in just 90 minutes."
NASA Hypersonic Research

Enable routine, reusable, airbreathing hypersonic flight

Engaging industry to foster emerging vision

Addressing key technical challenges for reusable hypersonic flight
• System analysis and uncertainty quantification
• Combined cycle propulsion systems
• Aerodynamics, aerothermodynamics, and controls
• High temperature, durable materials and structures

Leveraging comprehensive DoD ground and flight tests

Unique NASA testing capability and analysis provides a National resource