Air Force Materiel Command

US Air Force Initiative to Enhance Hypersonic Test Capabilities

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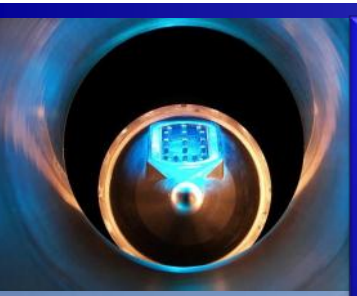
Deliver and Support Agile War-Winning Capabilities

AIR FORCE TEST CENTER

AFTC is the only organization in the US Air Force responsible for Developmental Test & Evaluation

DT&E is a crucial part of all acquisition processes and the key to the success of all weapon programs

AF Test Center Mission and Vision




Conduct Developmental Test and Evaluation of air, space, & cyber systems to provide timely, objective, and accurate information to decision makers

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412TH TEST WING

ARNOLD ENGINEERING DEVELOPMENT COMPLEX

Tester of Choice…Today and Tomorrow







Hypersonics DT&E

An AFTC Enterprise-Wide Endeavor

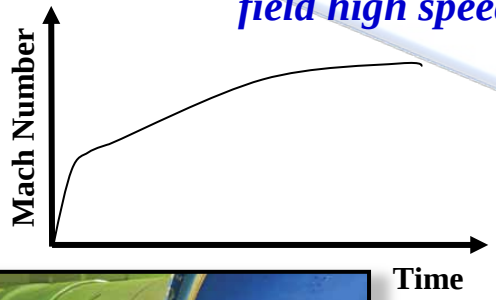
Partnering with Test Resource Management Center to Close Hypersonic T&E Capability Gaps

AFMC

Developing and Investing in Improved Test Tools, Technologies, Techniques, Facilities, and Technical Workforce for Ground Test, Flight Test, and Modeling and Simulation to Enable Effective Acquisition-Caliber T&E of High Speed Systems

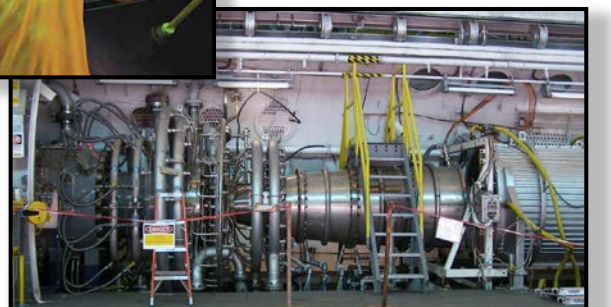
Goals

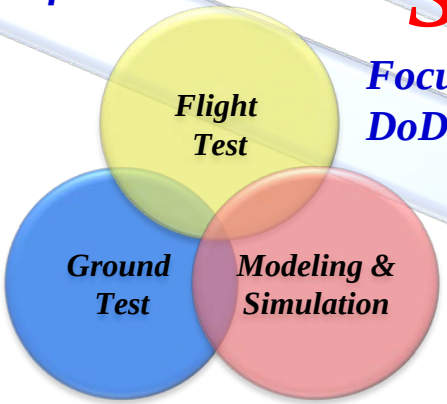
DoD T&E capability to effectively develop and field high speed systems



Needs

Improved tools, techniques, capabilities and technical workforce for…





Solutions

Focused investments in DoD Test Ranges/Centers

Air Force Test Center

Test Resource Mgmt. Center

TEST & EVALUATION HSST HIGH SPEED SYSTEMS TEST SCIENCE & TECHNOLOGY

Hypersonic T&E HyTIP Investment Program

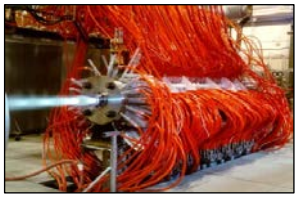
Partnering with Test Resource Management Center to Close Hypersonic T&E Capability Gaps

T&E/S&T High Speed Systems Test (HSST) Technology Area

<u>Mission</u>: Develop and transition technologies for high speed systems T&E

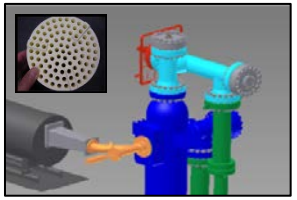
- **Paving the way to close critical MRTFB gaps**
- **Managed ~$200M in technology development projects since inception**
- **HSST projects are key to achieving future national T&E capability vision**

Mid Pressure Arcjet



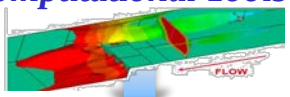
Remote Sensing & Telemetry

Clean Air / Variable Mach

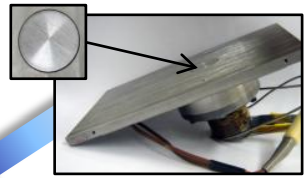


Advanced Propulsion

Computational Tools



Instrumentation



Aerodynamic & Aerothermal

Hypersonic Systems T&E

Flight Test

Collaboration

- **Government**
- **Industry**
- **Universities**

Congressionally Directed Hypersonic T&E Infrastructure Study

- **Led by Office of Science & Technology Policy (OSTP) and DoD**
  - **Use cases: conventional boost-glide and scramjet cruise missiles**
  - **Re-useable platforms were recognized but not considered for the study**
- **Participants included:**
  - **OSTP, TRMC, Military Services**
  - **Testers and facility owners**
  - **Weapon technology developers (DARPA, AF, Navy, Army)**
  - **Acquisition stakeholders (government and industry)**
- **Assessed facility readiness for Developmental Programs**
  - **Identified Critical T&E Gaps**
- **Presented 5 year/$350M T&E Infrastructure Roadmap**
- **Roadmap fully funded in FY17-21 President's Budget**

National Level Program to Advance Hypersonic T&E Infrastructure

Hypersonic T&E Investment Program

T&E Capability Enhancement Areas

Aeropropulsion

Improving Propulsion Ground Test Methods, Expanding Test Envelopes, Improving Accuracy & Fidelity

Aerodynamic & Aerothermal

Improved Aeroheating & Ablation Test Capabilities, Improved Flow Quality, Aero-Thermal Structural, Aero-Optics, High-Speed Munitions Dispensing Testing

Weather Effects

Developing Capability to Simulate Thermo-mechanical Responses of High Speed Thermal Protection Systems and Control Surfaces in Natural Environments

GN&C, Seekers, Lethality

Developing Integrated End-to-End Hardware in the Loop Mission Simulation; GN&C and Seeker/Sensor; Ordnance Evaluation

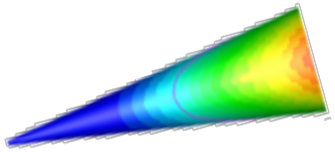
Flight Test

Evaluating Range Corridor and Infrastructure Needs, Improving Mission Assurance and Launch Flexibility, Developing In-Flight Measurements, Increasing Data Capture per Flight

Instrumentation & Test Techniques

Innovative New Sensors, Improving Accuracy, Increasing Measurement Ranges, Test Techniques for Improved Correlations

Modeling & Simulation



Improved Flight Performance Prediction Capabilities. Validating Codes, Developing Complex Physics-Based Tools

Workforce Development

Develop Advanced Workforce Skills, Techniques, and Expertise for Current and Future Hypersonic T&E Workforce

M&S, Instrumentation & Test Techniques, and Workforce Development Embedded in Multiple Capability Enhancement Areas

Hypersonic Weapon Development

A "Manhattan" Class Effort

AFMC

- Will require …
  - The development of new test facilities, capabilities, techniques and analytical methods
  - Close collaboration between the research, development, and test communities
  - Significant capital investment in all the above

Yes … Huge Challenges … But also Huge Dividends