

Marshall Space Flight Center

Solid Propulsion Systems, Thrust Vector Control, and Advanced Propulsion Division

Engineering Solutions for Space Science and Exploration

The Control (TVC) and Advanced Propulsion Division performs engineering development, oversight, and integration of solid propulsion systems, pyrotechnic and separation systems, TVC systems, and advanced propulsion technologies for space transportation applications, ensuring the sustained, safe operation of existing systems as well as the successful development of new systems.

The Division partners with our customers and provides component and systems engineering expertise for development or evaluation of existing and advanced technologies, conceptual designs, detailed design, system analyses, component and system integration, test plans, testing, and experimental data. The Division provides component and system engineering excellence to NASA's solid propulsion, pyro, TVC, and propulsion research activities.

Solid Propulsion and Pyrotechnic Devices Branch

Capabilities

We provide Engineering and Chemistry expertise in major areas of Solid Propulsion and Pyrotechnic Systems that include propellant and pyrotechnic chemistry, Propellant Liner and Insulation, propellant processing, test and evaluation. Our staff is experienced in solid rocket motor, hybrid rocket motor and pyrotechnic design and performance modeling. Our facilities are capable of mixing and casting hybrid and inert fuel grains and testing of solid and hybrid rocket motors as well as pyrotechnic systems.

Thrust Vector Control Systems Integration and Components Branch

Capabilities

We provide engineering expertise for the design, analysis, integration, assessment, test, and evaluation of TVC systems and components. Our staff is experienced in hydraulic, electrohydraulic, and electromechanical actuator and control systems design and performance modeling.

TVC Test Lab – research, development and qualification testing of components and systems, both electrohydraulic and electromechanical. Lab includes inertial load simulators, linear load bench with static and dynamic load, variable flow hydraulic supply, gaseous hydrogen and helium, data acquisition and control system capable of actuator control, health and status monitoring, and high-speed data acquisition.



2-Axis Inertial Load Simulator TVC Test-Stand



Orion Launch Abort System (LAS) Jettison Motor



Orion Launch Abort System Attitude Control Motor



Space Launch System Advanced Booster Prototype TVC Actuator

Propulsion Research and Technology Branch

Capabilities

We provide expertise in developing advanced propulsion technology concepts and performing hardware and experimental evaluations using quick prototyping approaches and rapid test setups for proof of concept and model development. Branch personnel have a wide range of knowledge and experience covering thermal/fluids, plasma physics, high power/pulsed power, nuclear engineering, cryogenics, analysis/trades, storable propellants, reaction control systems, prototyping/fabrication, and test setup/ execution.

Propulsion Research and Development Laboratory -

extensive lab facilities for research and development testing of nuclear thermal propulsion, cryogenic fluid management, and green propulsion systems and components. Labs include capabilities for gaseous hydrogen (GH₂), liquid nitrogen (LN₂), and vacuum conditions and high-power electrical heating to simulate nuclear reactor conditions. Labs also include capabilities for testing of green propellant thrusters and components under ambient and vacuum conditions.



Plasma Thruster Testing in Vacuum Chamber



Nuclear Thermal Rocket Element Environmental Simulator Test Facility

National Aeronautics and Space Administration

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