

Marshall Space Flight Center

Space Systems

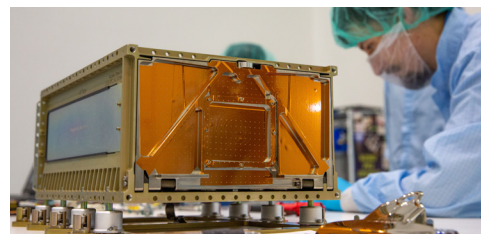
To efficiently deliver exceptional technologies, products,
and systems that enable space exploration and discovery

Marshall's Space Systems Department develops, designs, assembles, integrates, tests, and delivers flight, ground, prototype, and development products for human space flight programs, science investigations, and deep-space exploration initiatives. The department offers a strong array of expertise and capabilities in the areas of flight and ground software, avionics, mechanical and electrical fabrication, and engineering design across a wide range of projects. It plays a vital role in providing design, development, testing, and evaluation of space systems and expanding Marshall's portfolio of capabilities in support of NASA missions of all complexities and sizes, while forging partnerships across NASA, other government agencies, commercial industry, international partners and academia.

Space Systems Department

- Provides technical engineering leads and systems engineers to integrate all classes of projects by applying modern principles, practices, tools and multi-discipline engineering support for the development and production of space products.
- Offers comprehensive mechanical and aerospace engineering expertise in design, analysis, fabrication, assembly, and integration, delivering structural, unique mechanisms, optical, thermal, and fluid system hardware for advanced technology implementation, small spacecraft, critical ground hardware for human space flight programs, science investigations, and exploration initiatives
- Provides electrical design, development, fabrication, testing, and evaluation of avionics systems, such as electronic control systems, data systems, power electronic systems, RF and communication systems, flight instrumentation systems, inertial components for Guidance, Navigation, and Control (GN&C) systems, flight instruments and sensors, and imaging systems
- Provides analysis and testing of Electromagnetic Environmental Effect, Electrical Failure Analysis, and electric, electronic, and electromechanical (EEE) parts screening and analysis

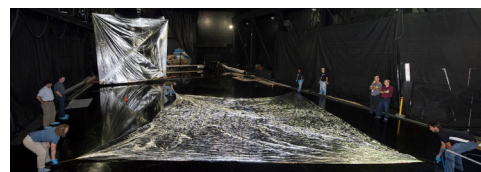
- Performs research, design, development, fabrication, and testing of electronic circuits and systems, instrumentation and signal conditioning, imaging, flight computers, sensors, power supplies, custom magnetics, data busses, and digital systems
- Provides extensive expertise in the development and delivery of Maturity Level 3-rated flight software and ground software, including software development facilities, avionics and software ground systems test facilities, and operation facilities
- Offers subject matter experts in payload, satellite, lander, International Space Station (ISS) facilities and Environmental Control and Life Support Systems (ECLSS) development, integration, testing, and on-orbit operations
- Provides testing of instruments, racks, payloads, and subsystems, in addition to the design and development of specialized sensors and science instruments, including a wide variety of systems and orbital and suborbital payloads



**Near-Earth Asteroid
Scout CubeSat.**



**Marshall Grazing
Incidence X-ray
Spectrometer (MaGIX-2)
testing in Stray Light
Test Facility.**



**Solar sails displayed on
the Flat Floor Facility.**

Capabilities

Systems Engineering and Integration

- Provides value-added solutions to a broad spectrum of challenges, from initial concept trade studies through sustaining engineering
- Manages interfaces; develops and evaluates ground integration, operations, and maintenance; offers sustaining engineering, supportability, and logistics planning

Mechanical and Optical Design, Analysis, and Fabrication

- Designs, analyzes, and optimizes mechanisms and structures, experiment hardware, payloads, subsystems, spacecraft (traditional, small, and micro satellites) and robotic or crewed planetary for atmospheric and spaceflight missions
- Analyzes structural designs in terms of stress, fracture and fatigue, and strength verification
- Fabricates, assembles, and calibrates grazing incidence and replicated optics

Avionics

- Offers full-cycle, conceptualization-to-finished-product development of electronic control systems, data systems, and flight instrumentation products
- Researches, engineers, designs, and develops instrumentation and advanced sensors, electronics circuits, imaging and video systems, radio frequency systems, computer-controlled subsystems, and advanced optics
- Designs, analyzes, evaluates, and tests power systems and power electronics and integration hardware, including cables and circuit protection, printed circuit board schematic layout and thermal analysis, and EEE parts failure analysis
- Analysis and test support for electromagnetic environmental effects (E3) including electromagnetic interference (EMI) and electromagnetic compatibility (EMC)

Flight and Ground Software and Simulation

- Manages software requirements development, processes and planning, and formal verification activities

- Designs and develops flight software and testing facilities and provides insight for external software development

Systems Development, Integration, and Test

- Offers conceptual design, detailed design, development, test, integration, and operations of science instrument experiments, racks, payloads, systems, and subsystems
- Offers requirements definition, conceptual design, detailed design, development, test, integration, launch, and mission operations



Electrical Shop technician at work.



Space Launch System (SLS) Systems Integration Lab.



Crew working on Distillation Assembly.



Handheld Universal Lunar Camera Testing.
Photo Credit: ESA/DLR M. Diegeler

Key Benefits

- Full lifecycle design, development, testing, and integration of electronic control systems, data systems, and flight instrumentation systems products including state of the art imagery systems.
- World-class facilities for testing flight software with hardware in-the-loop to validate products prior to manufacturing and flight
- Experienced cadre of discipline and systems engineers to assist with integration of all project sizes
- Proven delivery of high-value products for long-term space research

National Aeronautics and Space Administration

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