



Leading Human Exploration

Living and Working in Extreme Environments

NASA Johnson Space Center
HOUSTON, TEXAS

■ Welcome to the Johnson Space Center

I would like to personally welcome you to the National Aeronautics and Space Administration's Johnson Space Center. We have a proud heritage of over 45 years of innovation and technology development by the men and women who first dared to send humans beyond the boundary of our atmosphere. As we move forward into a new phase of leading human exploration for our nation, it is important that we leverage these national assets and capabilities to develop new collaborative commercial partnerships that will advance exploration and commerce. Johnson Space Center has a record of success working with aerospace and non-aerospace industries, government, and academia to solve technical problems and to transfer technology to the commercial sector for further development. We welcome the opportunity to explore common interests, develop new relationships and share the corporate knowledge, expertise and capabilities that our organization can provide to meet your commercial needs.

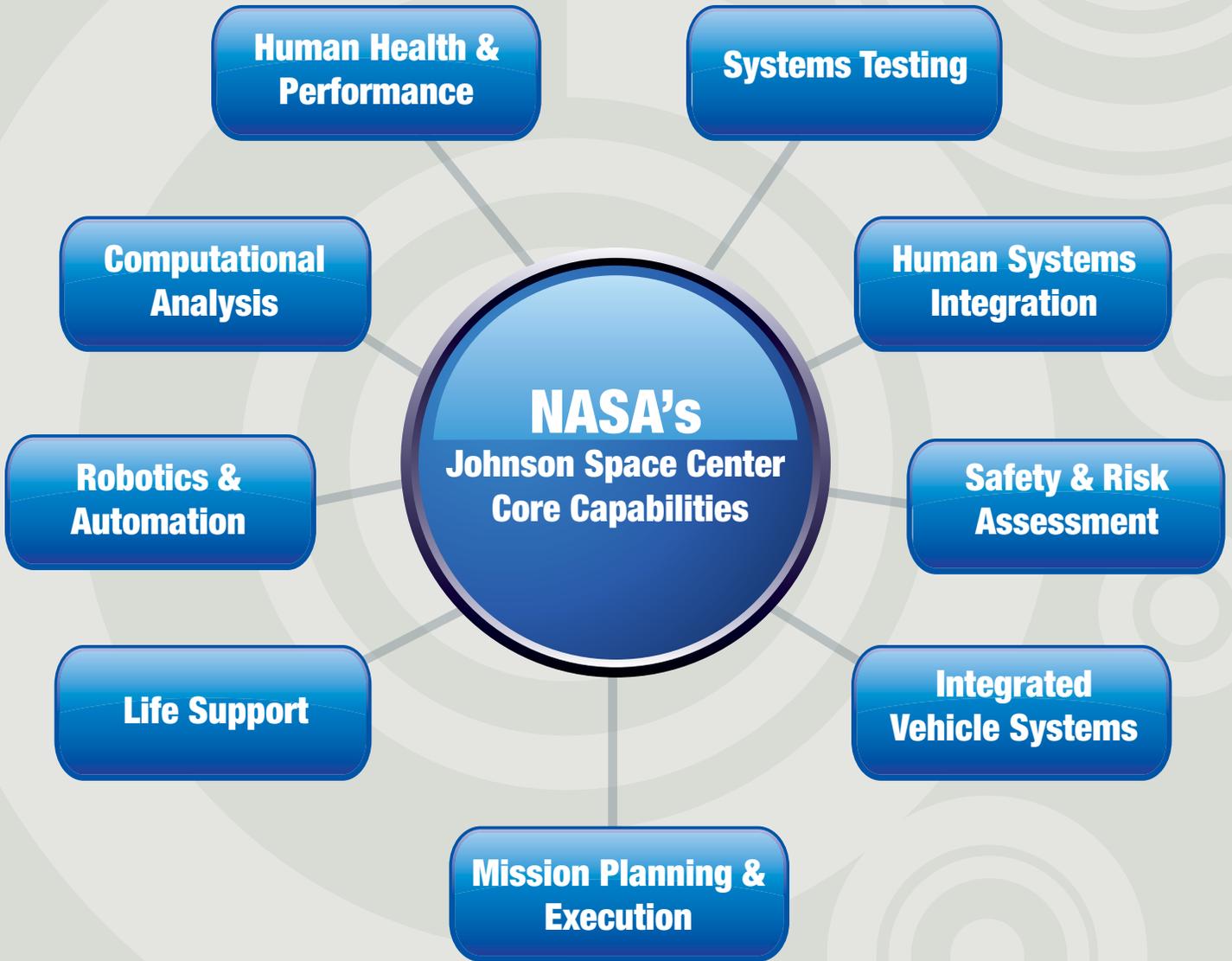
An aerial photograph of the Johnson Space Center campus, showing various buildings, parking lots, and green spaces. In the foreground, a man in a grey suit and glasses stands with his hands in his pockets, smiling. The entire image has a blue color cast.

Michael L. Coats

Michael L. Coats, Director
NASA Johnson Space Center

NASA Johnson Space Center Core Capabilities

The Johnson Space Center's unique core capabilities are divided into nine distinct areas of expertise and product development as well as testing facilities.



Human Health & Performance

We perform human health and performance research for technology development, space operations, and institutional and programmatic support. Our expertise includes countermeasures for exposure to ionizing and non-ionizing radiation, maintaining behavioral health and performance, research in the physiological changes from extended exposure to extreme environments, providing medical care, and maintaining a safe environment through solving human factors and habitability issues while conducting operational activities. Our laboratories, extreme environment analog facilities, and reduced microgravity environments help to advance our research programs. We also use the NASA Human Health and Performance Center, a virtual forum that was established to connect organizations who are interested in collaborating and advancing human health and performance innovations for space flight, commercial aviation, and challenging environments on Earth.



Physical Countermeasures



Human Factors



Biomedical Research



Medical Informatics



Environmental Factors



Medical Care and Systems



Biomedical Research



Human Physiology Studies



Advanced Food Technology

■ Robotics & Automation

We develop robotic and automated systems to help humans to work and increase productivity in extreme environments. Our software, robotics, and simulation teams improve system and program capability, operability, reliability, safety, and life-cycle costs. These activities include technology and advanced development tasks; flight experiment development; flight and ground hardware; software development and supply; program support track tasks including analysis, simulation, test, and verification; and crew training.

With our in-house capabilities, we can quickly design and build robotic system prototypes for concept evaluation. We work with customers to prototype an idea and allow for refinement of requirements and definition of the concept for operations.



Robotics



Exploration Mobility Systems



Robotic Work Assistance



Active Response Gravity Offload Systems



Human Power Assist Technology Robo-Glove



Experimental Electric Vehicles



Mobility Assist Exoskeletons



Robotic Bore Scopes

Human Systems Integration

We have expertise in habitability design, human factors for extreme environments, and integrating humans into complex engineering systems that ensures the integrated operational environment has the desired performance and capabilities. Our teams combine engineering solutions and multiple energizing technologies and use them in integrated test beds to evaluate the system concept, mission constraints, and human factors. Our integrated test beds include the Rapid Prototyping Laboratory, the Virtual Reality Laboratory, the Neutral Buoyancy Laboratory, a lighting test facility, and the Systems Engineering Simulators.



Human Factors Cockpit Design



Advanced Test Technique Development



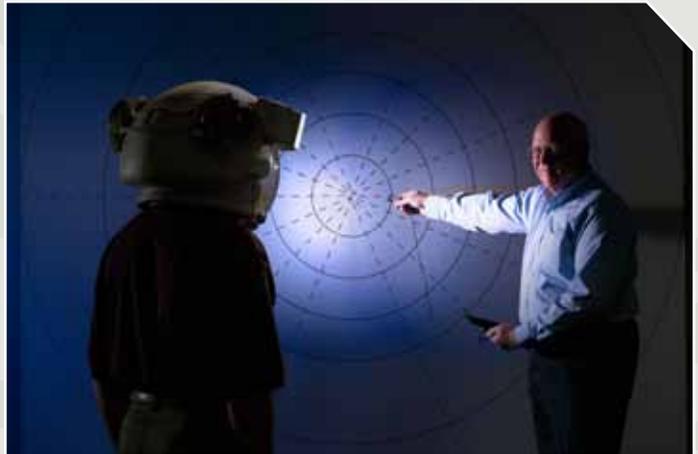
Habitability Design



Human Virtual Reality Laboratory



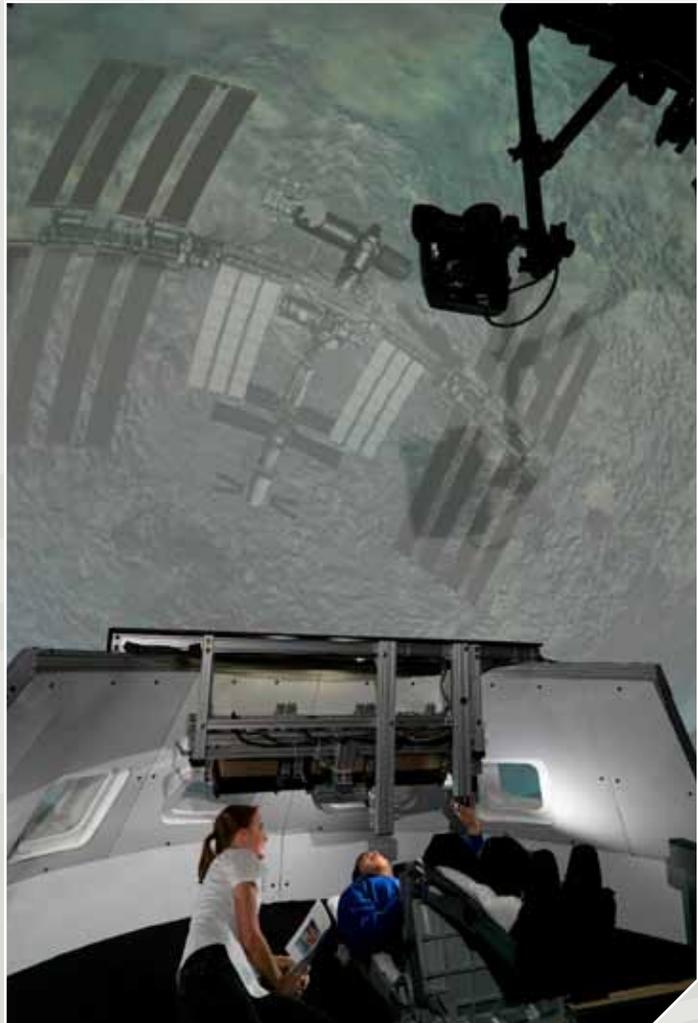
Reconfigurable Operations Cockpit



Lighting Environment Test Facility



Flight Deck of the Future Design



Usability Testing and Analysis Facility



Habitability Test Bed

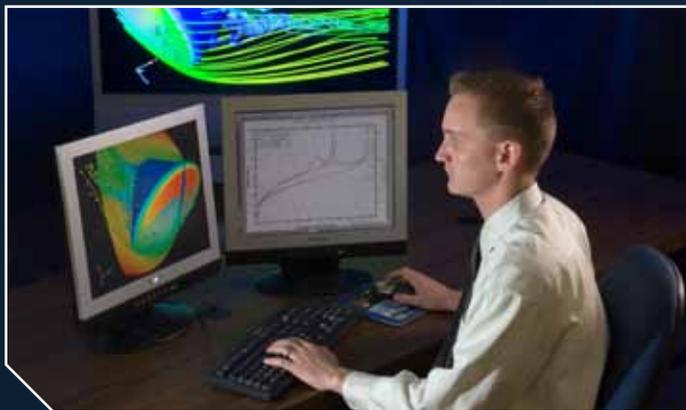
■ Computational Analysis

Operating in extreme environments requires special analysis, tools, and techniques that can evaluate and predict performance outcomes in both materials and systems. We offer a variety of capabilities in advanced and complex computational analysis for a range of applications, from advanced imagery analysis, to complex multi-physics computational fluid dynamics. The teams have extensive experience in using both commercial off-the-shelf tools and in-house developed tools for analysis and simulation modeling.

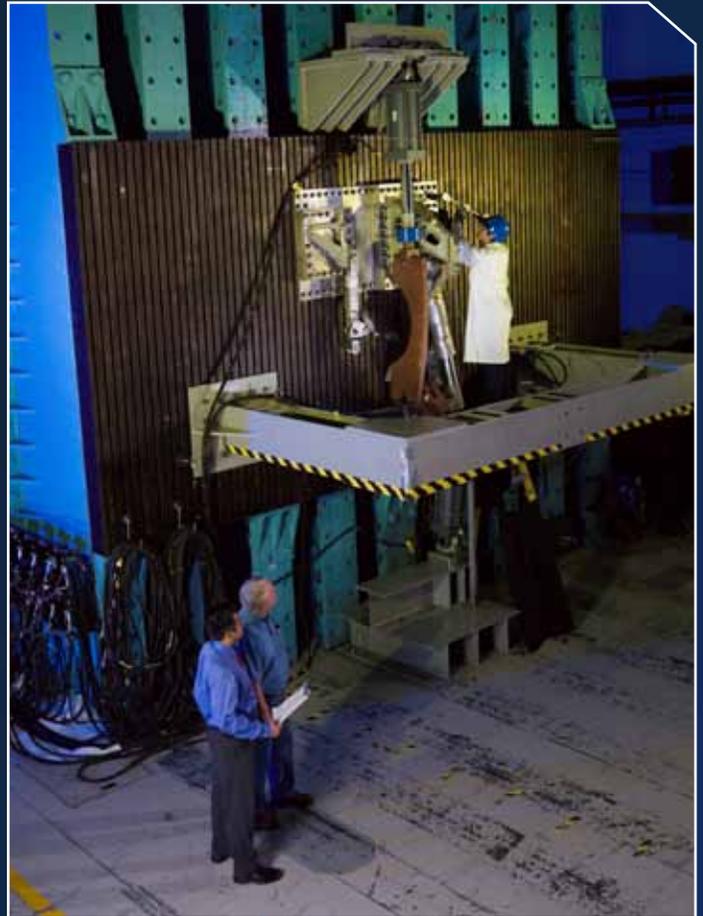
Our specialized laboratories include the Aerothermodynamic Heating Laboratory, Imagery Analysis Laboratory, Computational Electromagnetic Dynamics, Plume Impingement Analysis, Computational Fluid Dynamics as well as material and structural dynamics laboratories.



Systems Engineering Simulator



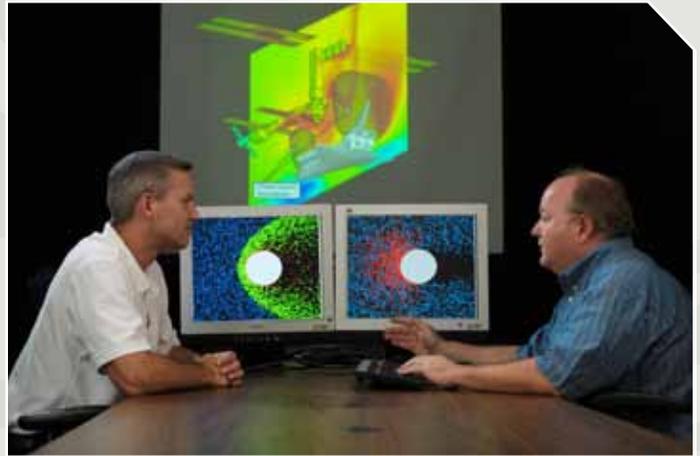
Computational Fluid Dynamics Laboratory



Structural Dynamics Laboratory



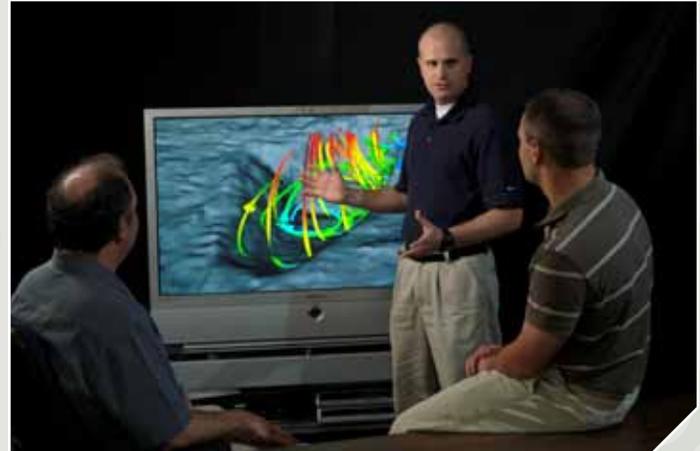
Software Testing and Analysis



Plume Impingement Analysis



Imagery Analysis



Aerothermodynamic Heating Laboratory

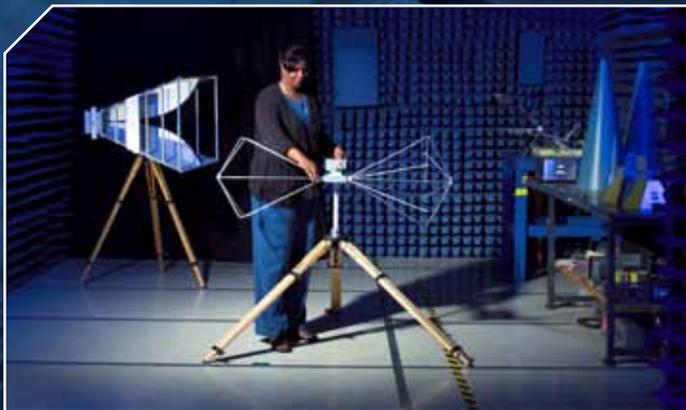


Computational Electromagnetics Laboratory

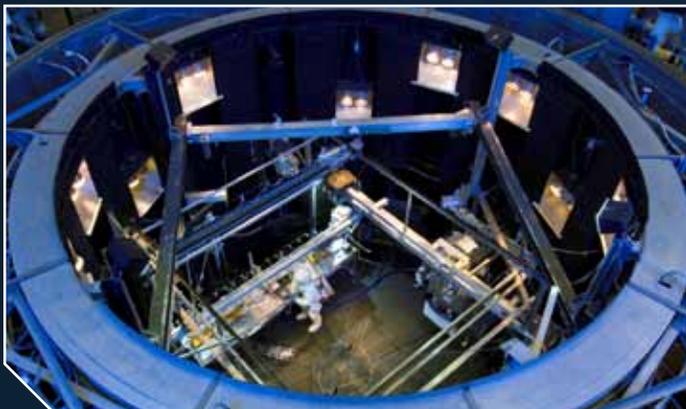
■ Systems Testing

We provide integrated environments facilities that test, evaluate, and certify components, materials, and hardware used in extreme environments. These facilities and capabilities include thermal vacuum chambers, high-heating environment and surface testing, electromagnetic testing, hypervelocity impact resistance, mechanical vibration, and acoustic vibration.

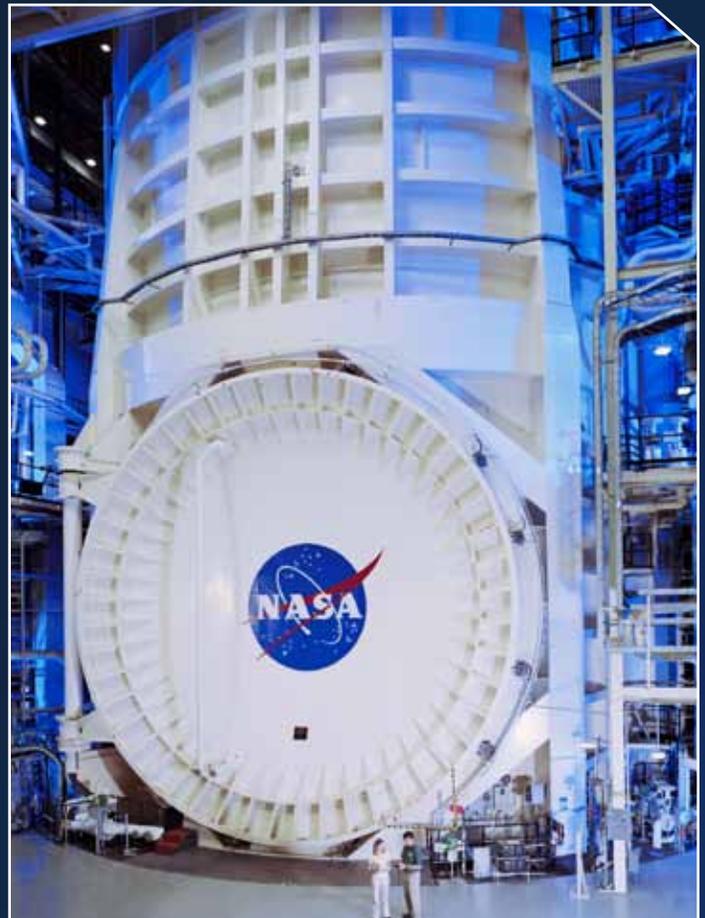
Our analysis, modeling, and interpretation of test results are unique. We have the capability to evaluate upgraded or redesigned components used in extreme environments to extend service life, enhance performance, and improve mission safety.



Electromagnetic Interference Compatibility Testing



Human Rated Thermal Vacuum Chamber



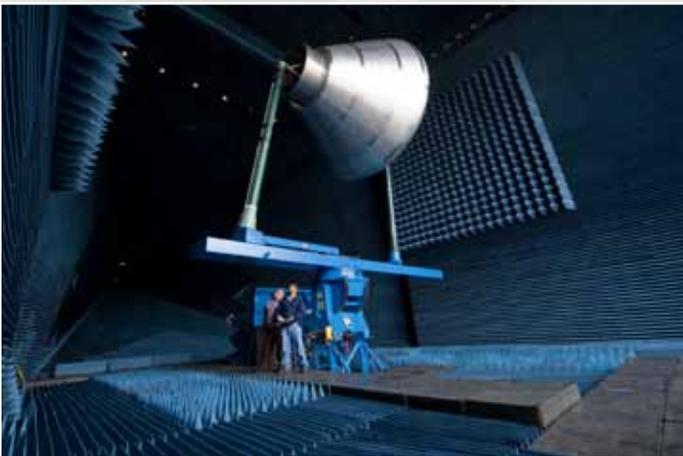
Thermal Vacuum Chamber



Materials Analysis



Atmospheric Re-entry Environment Testing



Antenna Testing



Thermal Testing



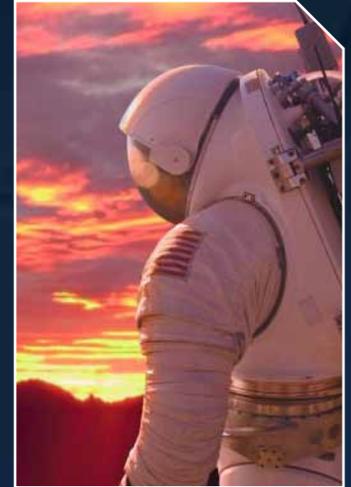
Human Rated Vacuum Testing



Human Vibration Testing

Life Support

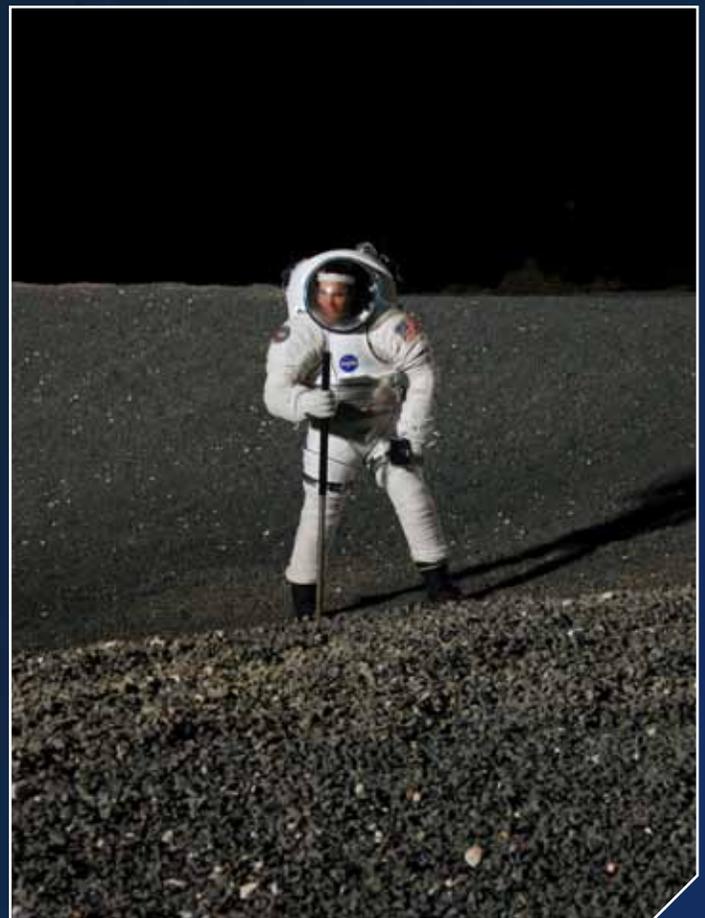
Living and working in extreme environments requires unique hardware to sustain and protect life. We provide protection, mobility, and life support to humans in extreme environments by offering expertise in space suits, environmental control, and human consumable regeneration systems. We also provide thermal systems hardware, environmental control systems, and integrated systems testing in pressures ranging from vacuum to one atmosphere. Our experience in living in these types of environments has given us unique knowledge in the areas of air quality, potable water, urine monitoring, regenerative fluids, and hygiene activities.



Water Recovery



Space Suit Systems Laboratory



Advanced Space Suit Development



Suitport Development



Softgoods/Materials Laboratory



Water Testing and Purification



Crew Survival Suit Checkout



Habitats Design

■ Integrated Vehicle Systems

We design space vehicle systems, combining structural design, analysis, testing, dynamic loads analysis, and performance and materials evaluations for manned and unmanned vehicles. Specialty areas such as reliable pyrotechnics, power systems and power quality, fluids management, batteries performance, imagery analysis, micrometeoroid debris analysis and design, cockpit design, radiation-hardened avionics, space environmental effects, thermal protection systems, and reliable software are integrated at the vehicle level for system-level optimum performance.

We integrate the disciplines and unique design requirements including operations. We can rapidly prototype conceptual cockpit designs to explore concepts and evaluate designs.



Structures and Materials Development



Control Systems Rapid Prototyping



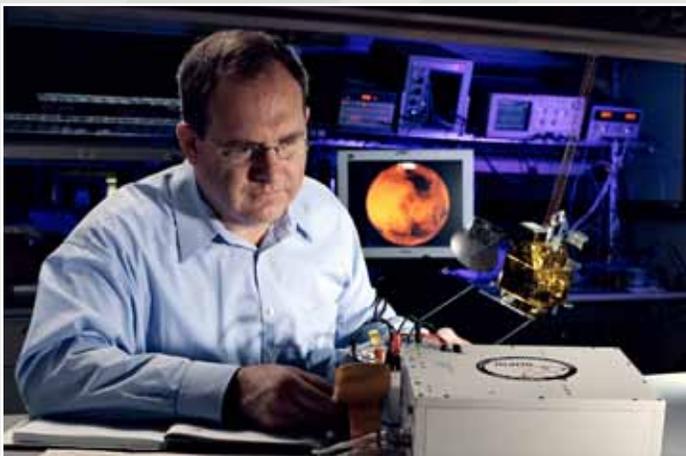
Integrated Propulsion



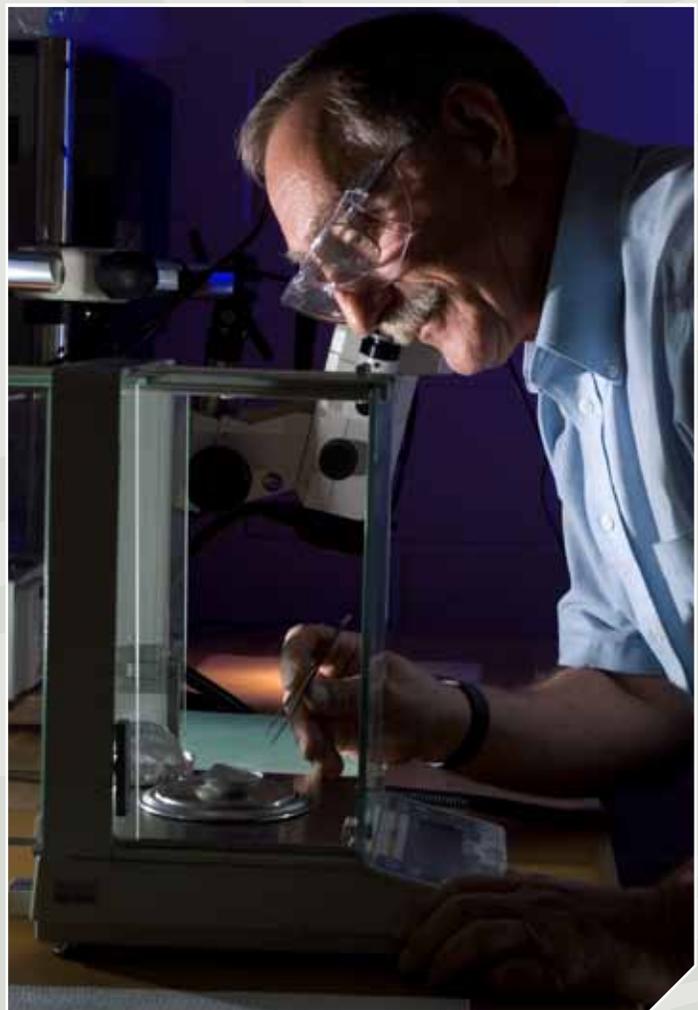
Integrated Power Systems



Thermal Management Design and Testing



Radiation Resistant Hardware



Pyrotechnic Separation Systems



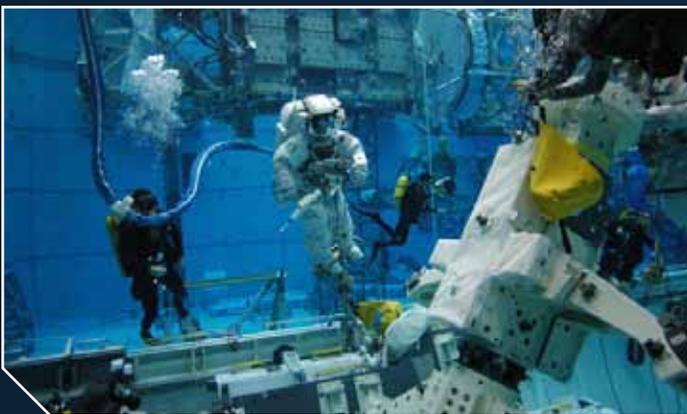
Avionics, Communication and Software

■ Mission Planning, Training & Execution

We offer capabilities in mission planning, crew training, flight product generation, and real-time operational support in the Mission Control Center. Our Plan-Train-Fly model incorporates expertise, leadership, and valuable lessons learned that create a mission operations team of technical excellence, with the agility to fit any mission. The technical excellence is built upon our leadership culture, which provides integration of complex task; makes critical risk trades in safety, mission success, cost, and schedule; and partners with private industry to deploy innovative solutions to mitigate redesigns and ensure operable spacecraft systems.



Monitor On-Board Spacecraft Systems



Train Flight Crew for Spacewalks



Consult in Spacecraft Operations Design



Developing Next Generation Control Systems



Extreme Environments Training



Simulation Systems



Training for In-Flight-Procedures



Training in Spaceflight Systems

■ Safety and Risk Assessment

We specialize in assisting organizations to operate successfully in high-risk environments. We provide customers with the analyses and recommendations necessary to make informed decisions to mitigate risks that lead to loss of life, physical assets, and production time. Using our comprehensive suite of risk assessment capabilities, we characterize the overall risk posture and optimize quality, reliability, safety, and profitability. Our unique approach provides the right balance of execution and oversight needed to manage and minimize risks.

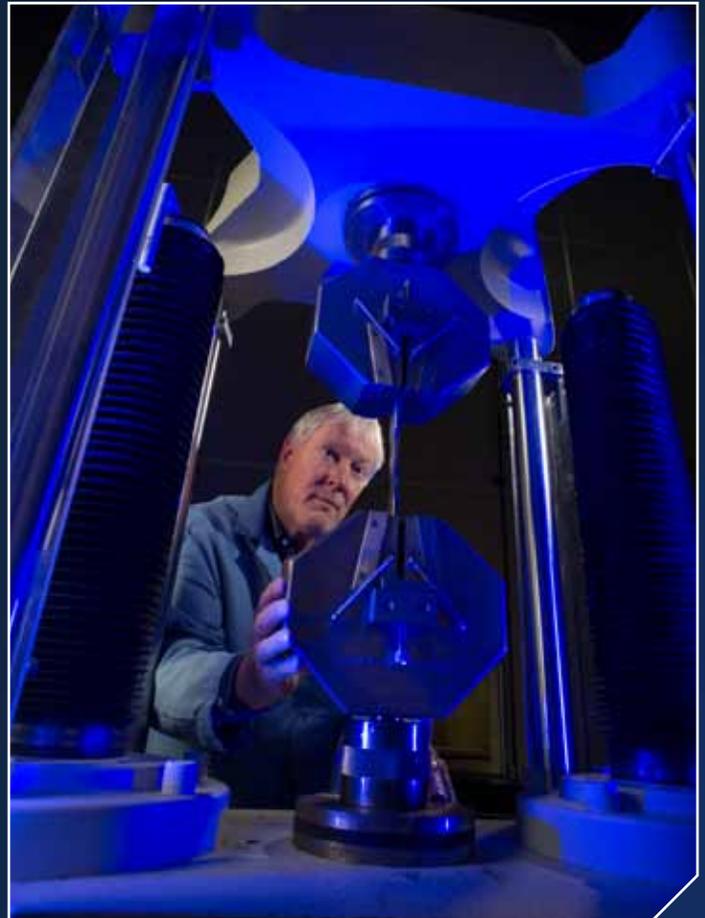
Our testing capabilities provide screening, evaluation services, and counterfeit parts detection in a AS9100 certified and ISO/IEC 17025 accredited laboratory. We also specialize in failure analysis, electronic component screening, and materials testing, and we provide “hands-on” workmanship standards training.



Risk Assessments and Hazard Analysis



Workmanship Standards Training



Fastener and Material Testing



Safety Training



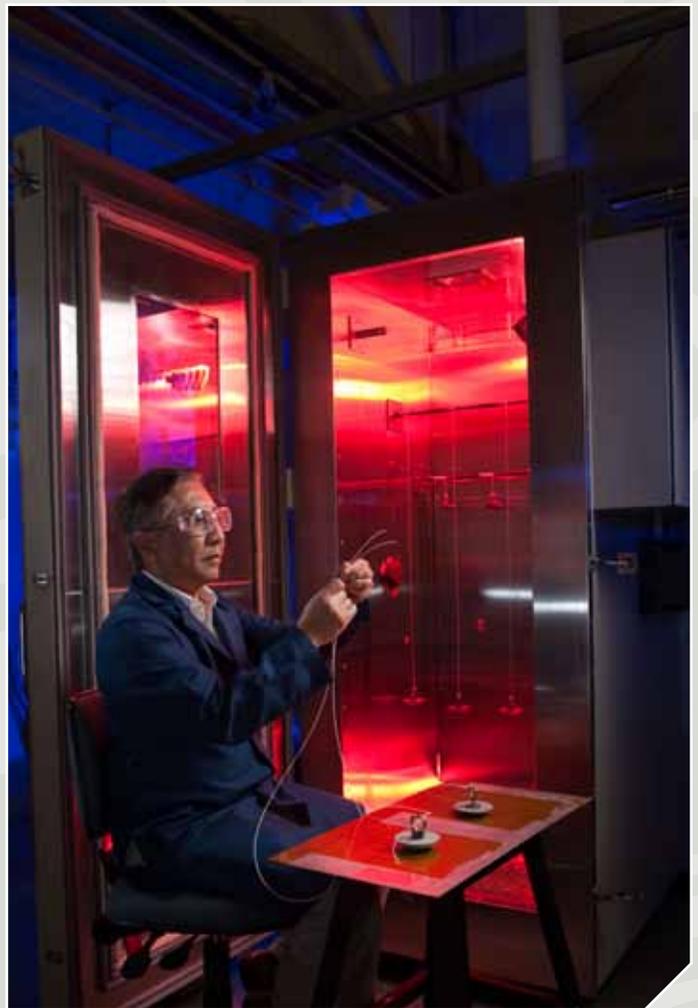
Electronic Parts Evaluation



Counterfeit Parts Detection



Failure Analysis



Electronic Component Screening

NASA Johnson Space Center Facilities

Health and Human Performance

- Anthropometry And Biomechanics Facility
- Graphics Research Analysis Facility
- Space Food Systems Laboratory
- Microbiology Laboratory
- Toxicology Laboratory
- Water And Food Analytical Laboratory
- Acoustics And Noise Control Laboratory
- Space Cell Biology Laboratory
- Space Radiation Dosimetry Laboratory
- Animal Care Facility
- Flight Medicine Clinic
- Bone Laboratory
- Cardiovascular Laboratory
- Core Bioanalytical Laboratories
- Exercise Physiology And Countermeasures Laboratory
- Environmental Physiology Laboratory
- Immunology Laboratory
- Neurosciences Laboratory
- Nutritional Biochemistry Laboratory
- Pharmacotherapeutics Laboratory
- Radiation Biophysics Laboratory
- Countermeasures Development Laboratory

Robotics & Automation

- Active Response Gravity Offload
- Dexterous Manipulator Testbed
- Dexterous Robotics Laboratory
- Robotic Motion Platform
- Rover Development Laboratory
- Six-degree-of-freedom Dynamic Test Systems
- Electronics Development Laboratory
- Mechanical Development Laboratory

Human Systems Integration

- Habitability Design Center
- Lighting Environment Test Facility
- Usability Testing And Analysis Facility
- Virtual Reality Laboratory

Computational Analysis

- Flight Mechanics Laboratory
- Aeroscience and Computational Fluid Dynamics Laboratory
- Advanced Guidance, Navigation, and Control Development Laboratory
- Kedalion Laboratory
- Systems Engineering Simulator
- Reconfigurable Operational Cockpit
- Spacecraft Software Engineering Facilities
- Computational Electromagnetics Laboratory
- Image Science and Analysis Laboratory

Systems Testing

- Electromagnetic Interference/Electromagnetic Compatibility Test Facility
- Antenna Test Facility
- Anechoic Chamber
- Air Bearing Floor
- Neutral Buoyancy Laboratory
- Integration Test Facilities
- Structures Test Laboratory
- General Vibration Laboratory
- Modal Operations Laboratory
- Sonic Fatigue Laboratory
- Acoustic Laboratory
- Atmospheric Re-entry Materials and Structures Evaluation
- Materials Evaluation Laboratory
- Energy Systems Test Area

Life Support

- Advanced Water Recovery Systems Laboratory
- Softgoods/Materials Laboratory
- Crew Survival Laboratory
- Vacuum/Thermal Human-Rated Test Complex
- High Vacuum/Thermal Test Complex
- 20-foot Human-Rated Chamber

Mission Planning, Training & Execution

- Mission Control Center Facility
- Spacecraft Motion-Based Simulator
- Spacecraft Fixed-Based Simulator
- Single Systems Trainer Simulators
- Space Station Training Facility
- Space Vehicle Mockup Facility

Safety and Risk Assessment

- Receiving, Inspection and Test Facility
- Safety Training Center

For information on these facilities, availability and point of contact go to:
www.nasa.gov/centers/johnson/capabilities





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www.nasa.gov/centers/johnson/capabilities

