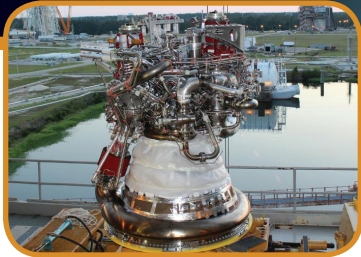


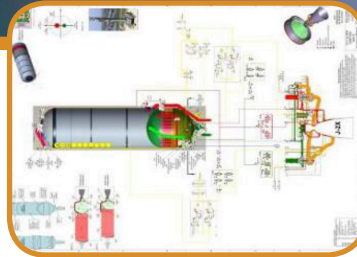


# Marshall Space Flight Center Propulsion Systems Design and Integration

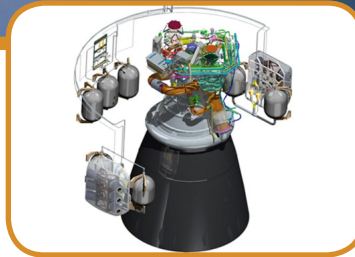
Engineering Solutions for Space Science and Exploration



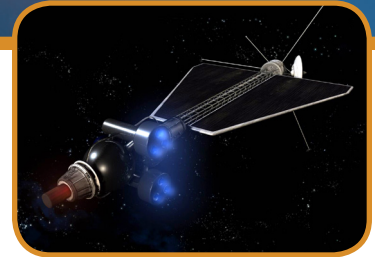
Engine Systems



Main Propulsion Systems



Spacecraft Propulsion Systems



Advanced Propulsion

## The Propulsion Systems Design & Integration Division (ER20)

provides technology development, system design, expert technical evaluation, and systems integration to advance the next generation of space transportation systems and assure continued safe operation of existing systems.

ER20 responds directly to customers requiring system level technology and concept evaluation, analysis, and maturation, detailed system development and propulsion component integration, test verification planning, evaluation, and certification. The division also provides sustaining engineering for operations support for space transportation propulsion systems.

ER20 provides engineering expertise for all transportation mission phases including boost, upper stage, in-space, and extraterrestrial descent/ascent applications. ER20 expertise includes liquid propulsion systems including cryogenics and storable propellants supporting a wide range of propulsion systems. Liquid systems expertise ranges from low thrust pressure fed in-space propulsion systems to high thrust, pump fed booster propulsion systems. In addition, this division supports non-chemical and nuclear propulsion and power systems, such as plasma systems and nuclear electric and thermal systems. Facilities available to the division include vacuum test positions and a wide range of component and subsystem test facilities resident at MSFC. The division routinely partners with other NASA Centers and Facilities for additional test capabilities.



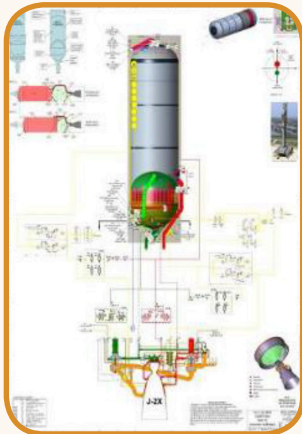
Space Launch System



# Capabilities

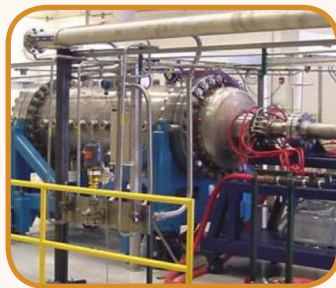
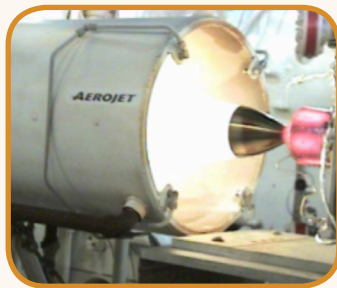
## Liquid Engine Systems

- Liquid Engine Systems Design and Integration
- Test & Evaluation, Ground Test and Flight Data Reviews
- Engine Systems Analysis–Fluid Systems Analysis
- Technology Development
- Concept Development and Requirements Derivation



## Main Propulsion Systems

- Pressurization, Feed and Propellant Systems Design and Integration
- MPS/Stage Test and Evaluation, Ground Test and Flight Data Reviews
- Main Propulsion Systems Analysis–Fluid Systems Analysis
- Technology Development
- Long-Duration In-Space Cryogenic Propellant Storage and Delivery Systems for chemical and nuclear propulsion stages
- MPS Concept Development and Requirements Derivation



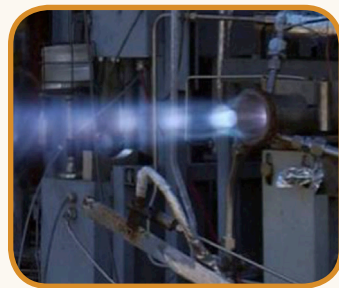
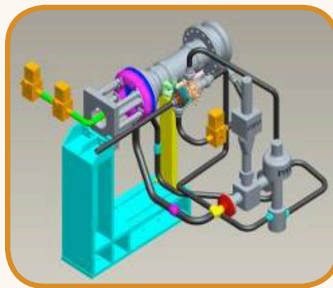
## Spacecraft Propulsion Systems

- Development and integration of pressure-fed chemical propulsion systems for satellites, spacecraft, descent/ascent vehicles, and launch vehicles
- Systems Test and Evaluation, Ground Test and Flight Data Reviews
- Systems Analysis–Fluid Systems Analysis
- Concept Development and Requirements Derivation
- Technology development for advanced chemical (including non-toxic) propulsion



## Propulsion Research & Technology Branch

- Cryogenic Fluid Management Research and Advanced Development
- Nuclear Systems (Propulsion/Surface Power) R&D, Demonstrations
- High Power Electric/Plasma Propulsion, Design and Testing
- Advanced Propulsion & Power Systems, Research Development and Test



For more information, please visit [www.nasa.gov/centers/marshall/about/business.html](http://www.nasa.gov/centers/marshall/about/business.html)

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