National Aeronautics and Space Administration

JSC Engineering Capabilities

Commercial Human Space Flight Symposium
October 13-14, 2010

Steve Poulos

Future Commercial Human Spaceflight

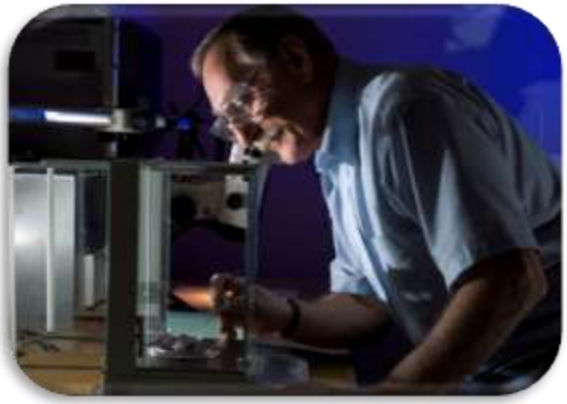
"The future cannot be predicted, but futures can be invented." - Dennis Gabor, 1963

Engineering Capabilities

Integrated Manned Space Vehicle Systems

- Avionics, Communication & Software
- Radiation resistant hardware
- Structure and Materials Development
- Integrated Power
- Thermal Management
- Mechanical Separation
- Integrated Spacecraft Propulsion

Armadillo Aerospace LOX Methane



Pyrotechnic Initiator

Power Distribution Laboratory

Nondestructive Ultrasonic Testing

Engineering Capabilities

Life Support Systems and Integrated Environmental Control

- Space Suits
- EVA
- Habitats
- Regeneration
- Waste Management

Water Regeneration

Rover with Mark IV Advanced Space Suit

Space Suit Laboratory

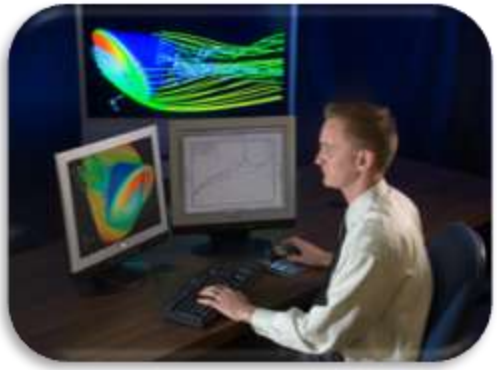
Habitation Module

Engineering Capabilities

Flight Design

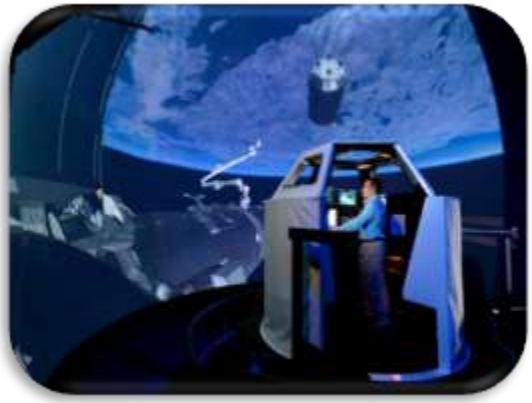
- Ascent and Abort Performance
- On-Orbit Flight
- Proxmity Operations
- Automated Rendezvous and Docking
- Entry Performance
- Landing Recovery Systems

Low Impact Docking



Computational Analysis

Collaborative Flight Design



Engineering Simulation

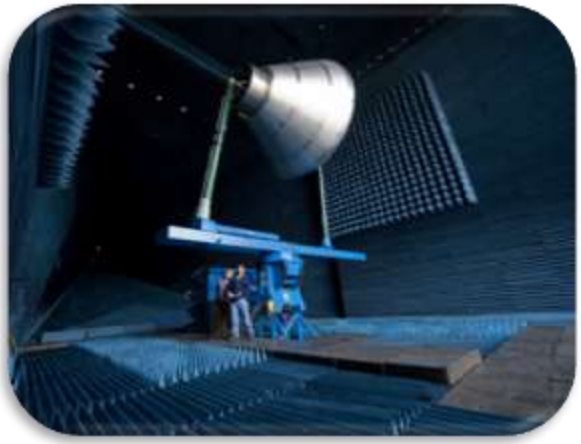
Parachutes

Engineering Capabilities

Integrated Environments Testing and Analysis

- Launch Dynamics
- Entry Environment
- Space Environment (man made and natural)
- Thermal Vacuum Chambers
- Electromagnetic Testing

Thermal Vacuum Chamber



Anechoic Chamber

Arc Jet control room

Radiant Heat Chamber

Successful Partnerships

Research & Development

NASA Resource: Engineering – Expandable Space/Surface Structures

Partner: Bigelow Aerospace

Goal: Develop technology to gain important insights and capabilities for development, launch, control and operations of expandable space/surface structures for long-term human space exploration goals.

Benefit: Construct and provide low-cost, robust, full-scale space habitats that can be preserved and utilized at minimum as a general concept by a domestic company.

Successful Partnerships

Suit, Tool, Mobility and Human Robotics

NASA Resource: Engineering Robonaut 2

Partner: General Motors

Goal: Accelerated development of the next generation of robots and related technologies for use in the automotive and aerospace industries

Benefit: Advanced leading edge control, sensor and vision technologies will lead to future robots that could assist astronauts during hazardous space missions and help GM build safer cars and plants.

Successful Partnerships

Life Support

NASA Resource: Regenerative life support – Sabatier Engineering Development Unit

Partner: Hamilton Sundstrand

Goal: Investigate Sabatier design characteristics with the objective of developing a safe, efficient and long life system for water recovery from hydrogen and carbon dioxide.

Benefit: This activity will immediately support the development of components for the Air Revitalization system in the International Space Station and will provide data for planning life support systems for possible future missions.

Successful Partnerships

Local Partnership

NASA Resource: Engineering Vibration test labs and sensor instrumentation

Partner: Texas Children's Hospital

Goal: To allow Texas Children's Hospital to use and/or adapt some of JSC's vibration isolation techniques to develop a vibration isolation system for neonatal patients.

Benefits: Mitigation of injuries to neonatal patients due to vibrations generated by transporting, including ambulances and helicopters.

Future Successful Partnerships

"...the United States was not built by those who waited and rested and wished to look behind them. This country was conquered by those who moved forward, and so will space." - John F. Kennedy, 1962

Back-up

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