

**Exploration**

**Technology Exchange Conference**

**Propulsion Government Panel**

# Exploration Technology Exchange Conference

9:00 Introduction  
9:00 Propulsion Government Panel Agenda

9:10 Lunar Lander Technology Needs

10:10 Break

10:20 Ares Technology Needs

11:20 Propulsion and Cryogenics Advanced Development  
Project and Cryogenics Fluid Management Project

11:40 General Discussion and Wrap Up

**Feel free to ask questions at any time.**

# Exploration Technology Exchange Conference

## Propulsion Government Panel

Tom Brown

Lunar Lander Propulsion Lead

Phil Sumrall

Ares Advanced Planning  
Manager

Mark Klem

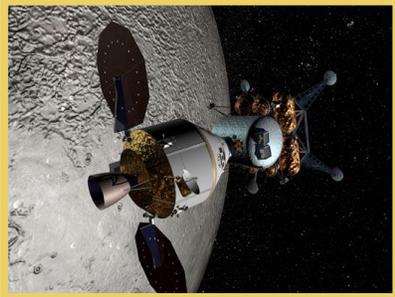
Propulsion & Cryogenics  
Advanced Development  
Project Manager

Susan Motil

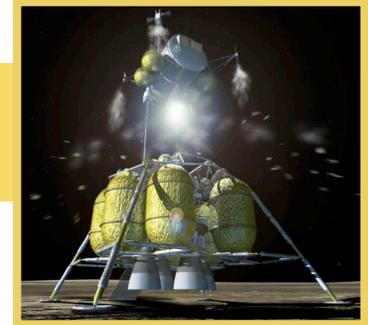
Cryogenic Fluid Management  
Project Manager

# Propulsion & Cryogenic Advanced Development (PCAD)

**Project Objective:** Reduce the risk associated with the use of **Green Propulsion** and accompanying systems for use in Constellation customer applications

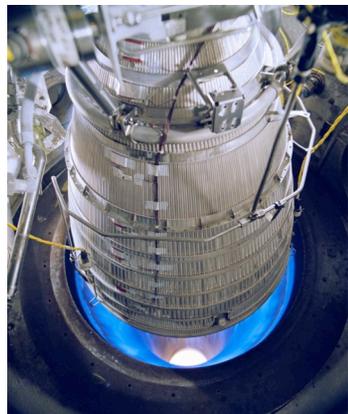
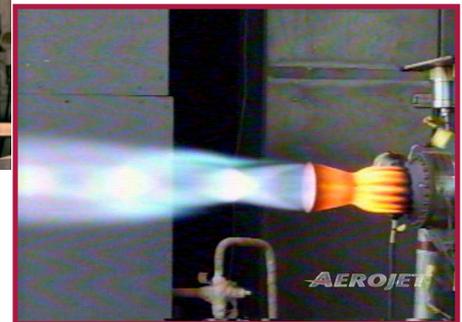


**Customers:**  
*Orion Crew Module, Lunar Lander*



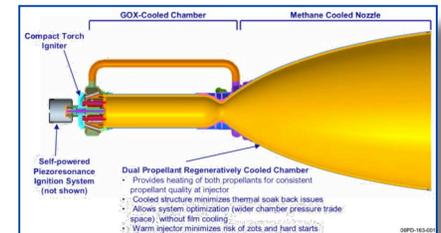
## Reaction Control Systems (RCS) Technology:

Design and test cryogenic **RCS** subsystems and components (ignition, engine design and test, and integrated RCS/feedsystem testing)



**Main Engine Technology:** Design and test multiple **Main Engine** concepts (ignition, ascent engines, deep throttle descent engines)

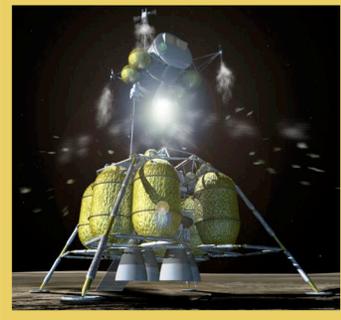
**Gaseous Oxygen/Methane Engine Testing:** Perform **Orion Crew Module (CM) gas-gas Oxygen/Methane thruster and igniter** testing



**PCAD provides key, enabling data for Constellation system designs**

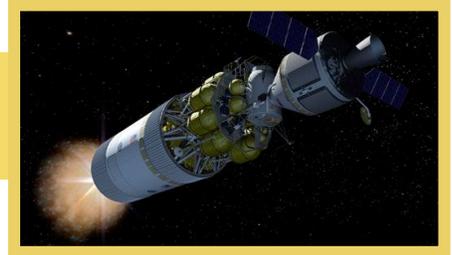
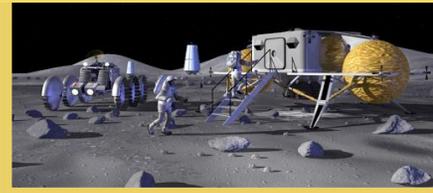
# Cryogenic Fluid Management (CFM)

**Project Objective:** Develop **cryogenic fluid management** systems in support of all Exploration missions requiring in-space operations with cryogenics

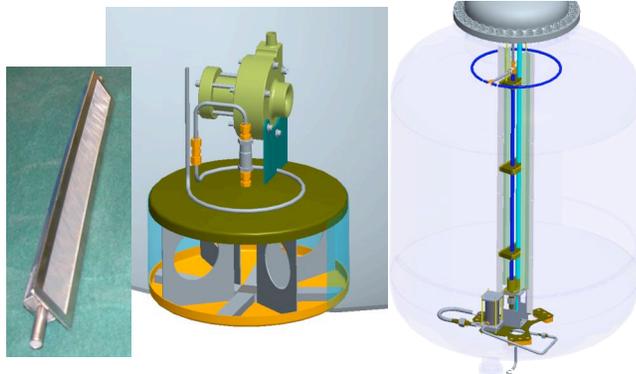
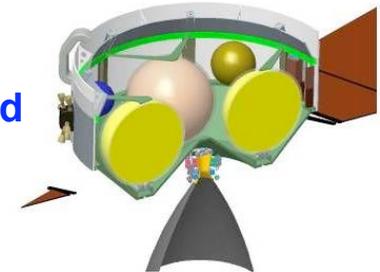


## **Customers:**

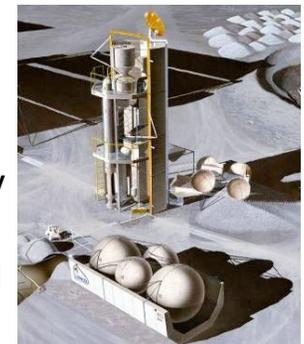
*Lunar Lander, Earth Departure Stage, Lunar Surface Systems*



**CFM Systems Technology:** Evaluate and predict performance of **integrated CFM systems** using cryogenic propellants, and evaluate the use of **common systems** for storage and distribution.



**Propulsion Systems CFM Technology:** Design and test advanced technology subsystems to **store** and **distribute** cryogenic propellants that will meet the need for high-performance propulsion systems on **long-duration missions**.



**Surface Systems CFM Technology:** Provide advanced development of technology required for **servicing** and **interfacing** with **lunar surface assets** including **liquefaction**, **storage**, and **transfer** of propellants on the **lunar surface** or transferred in near lunar space.

**CFM provides key, enabling data for Constellation system designs**