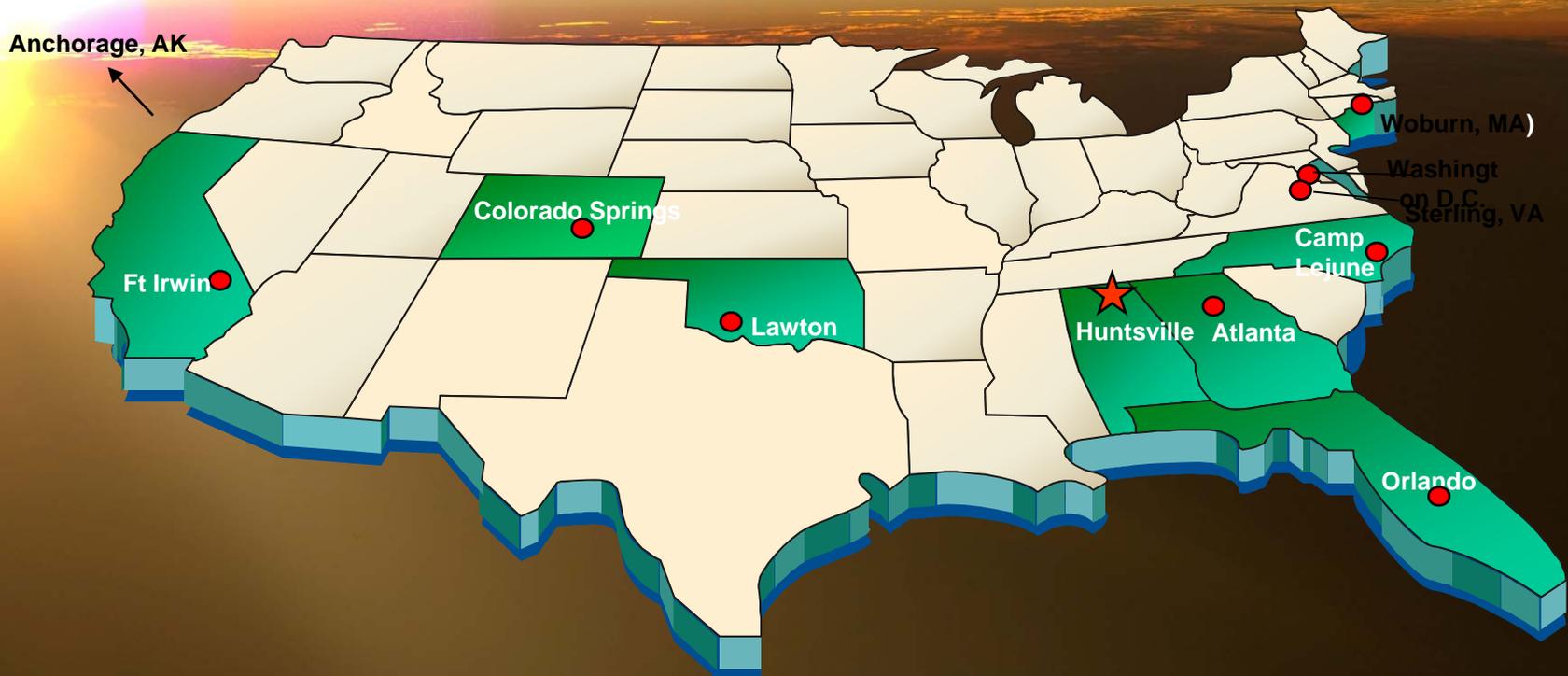




# TMI Company Background

- Financially sound Small Business (SB)
- Founded in 1988 to provide engineering, information systems technology, logistics support, multimedia, and management services
- Committed to excellence, innovation, quality, and total customer satisfaction at every level
- Corporate office in Huntsville, Alabama with regional offices throughout the United States





# TMI Space Flight Hardware Experience

- **TMI developed payloads:**

- **SUBSA:** *Solidification Using a Baffle in Sealed Ampoules*
- **PFMI:** *Pore Formation and Mobility During Controlled Directional Solidification In a Microgravity Environment Investigation*
- **CGH SACA:** *Coupled Growth in Hypermonotectics*
- **PEP SACA:** *Particle Engulfment and Pushing by Solidifying Interfaces Sample Ampoule Cartridge Assembly*
- **PEP:** *Particle and Engulfment and Pushing*
- **WCI:** *Wetting Characteristics of Immisibles*
- **QMI:** *Quench Module Insert*
- **AGHF:** *Advanced Gradient Heating Facility*
- **IPF:** *Interfacial Pore Formation*
- **BUNDLE:** *Bridgman Unidirectional Liquids Experiment Furnace*



NASA's first two MSG experiments were developed, built, and operated by TMI.



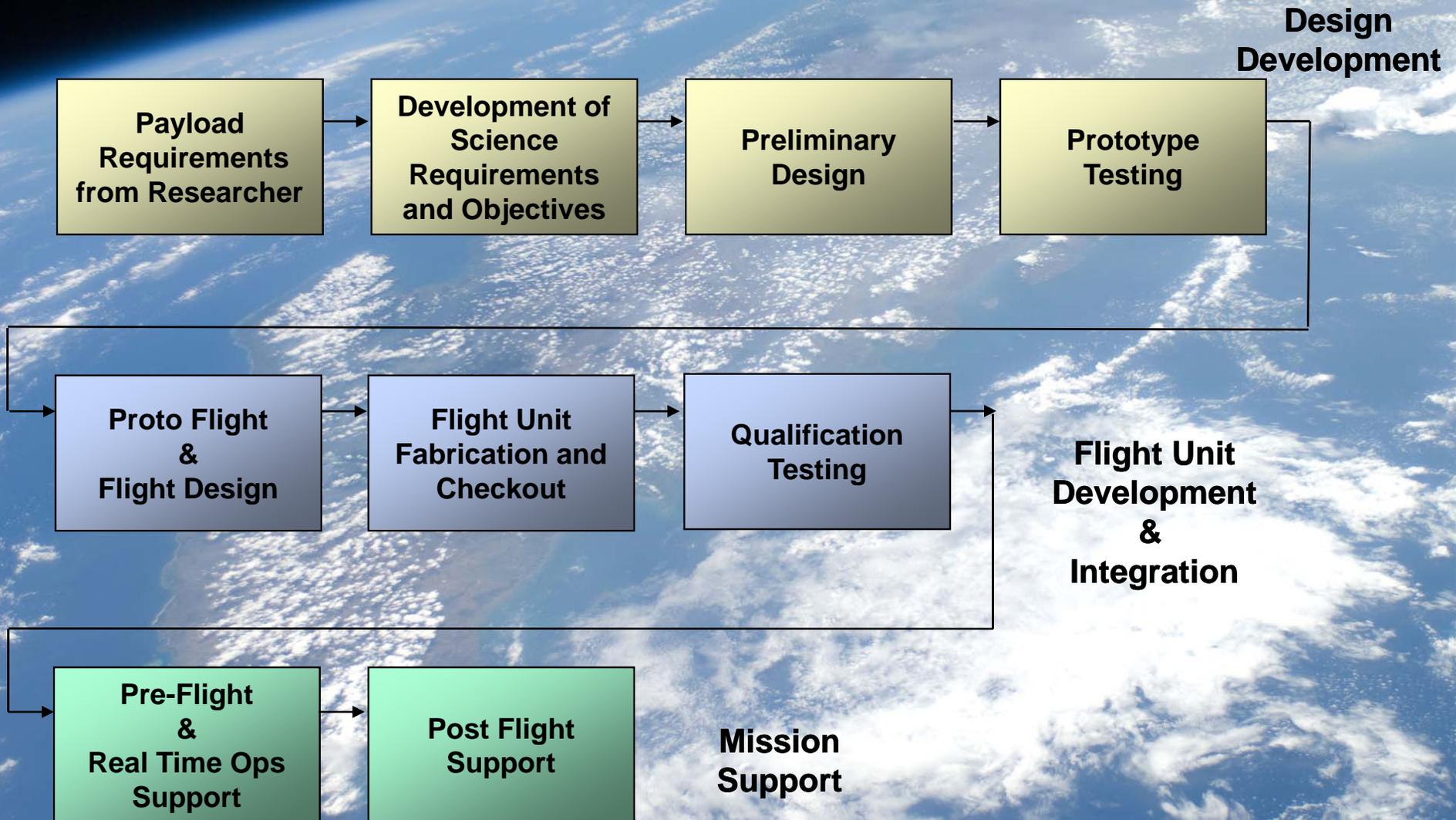
# TMI Glovebox Integration

TMI supports NASA by integrating experiment hardware into the Microgravity Science Glovebox on ISS

- Payload Requirements Support
- Integrated Analysis
- Integrated Verification



# Payload Development Process





# Design Development

**Payload Requirements from Researcher**

**Development of Science Requirements and Objectives**

- Research Requirements
- Resource Availability
- Candidate Facilities
- Flight Opportunities
- Project Plan

**Preliminary Design**

- Analytical Models
- Preliminary Drawings
- Material Compatibility
- Safety
- Vendor Selection
- Verification Plan
- Test Plan
- Software

**Prototype Testing**

- Fab/Assemble Test Unit
- Test Procedure/Support
- Thermal Test
- Vibration Test
- Data Analysis



# Flight Unit Development

## Proto Flight & Flight Design

- Update
  - Analysis
  - Drawings
  - Safety
  - Materials
  - Verification
  - Software

## Flight Unit Fabrication and Checkout

- Fab/Assemble Test Unit
- Safety Closeout
- Delivery and Fit Check
- Fab/Assemble Flight Units
- Fab/Assemble Ground Units
- Flight Readiness

## Qualification Testing

- Test Procedure/Support
- Thermal Test
- Vibration Test
- EMI & Acoustic Test
- Human Factors
- Data Analysis
- Verification Closeout



# Mission Support

## Pre-Flight & Real Time Ops Support

- GI Training
- CADRE Interface
- Facility
- Interface
- Flight Operations

## Post Flight Support

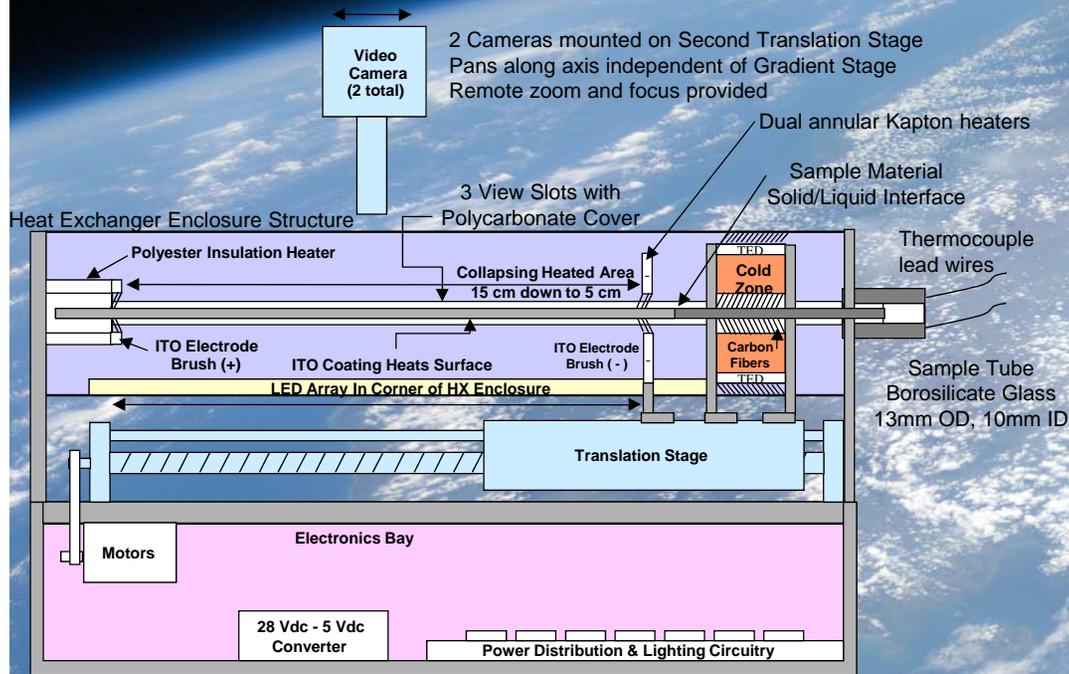
- Ground Reference Test
- Flight Data Analysis
- Tech. Transfer
- Paper Presentations





# PFMI:

## Pore Formation and Mobility Investigation



PFMI Thermal Chamber

### PFMI: NASA's 1<sup>st</sup> MSG Experiment

PFMI was a microgravity experiment that was operated on the International Space Station in the Microgravity Science Glovebox. PFMI was used to investigate crystal growth/bubble interaction in a microgravity environment to hopefully improve the production of uniform composites.

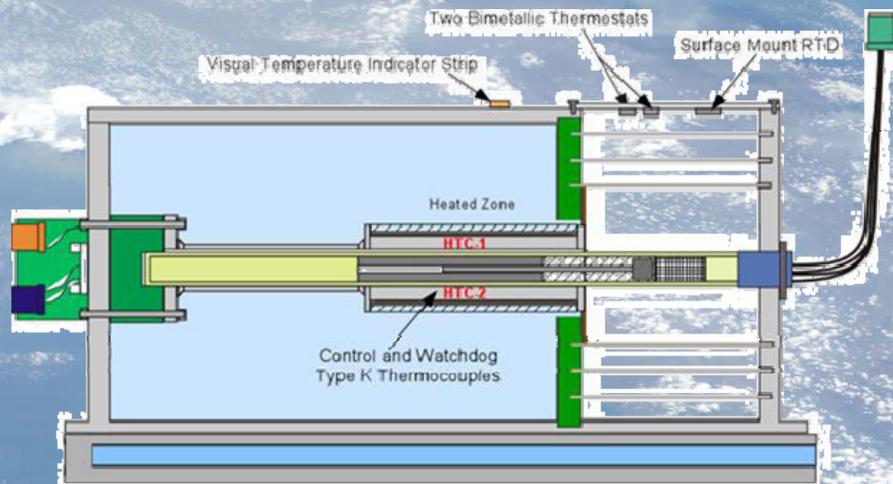


PFMI Sample Ampoule



# SUBSA :

## Solidification Using a Baffle in Sealed Ampoules



SUBSA Thermal Chamber

### SUBSA: NASA's 2<sup>nd</sup> MSG Experiment

SUBSA was a microgravity experiment that was operated on the International Space Station in the Material Science Glovebox. SUBSA was used to investigate Indium Antimonide (InSB) crystals grown in a microgravity environment using an automatically moving baffle to determine if it would significantly reduce thermal convection during sample processing.



SUBSA Sample Ampoule





# Space Flight Investigators

Experiment	Description	Investigator	Affiliation	NASA POC
SUBSA (MSG)	Solidification Using a Baffle in Sealed Ampoules	Dr. Alex Ostrogorski	University of Alabama Huntsville / Rensselaer Polytechnic Institute	Linda Jeter
PFMI (MSG)	Pore Formation and Mobility Investigation	Dr. Richard Grugel	Marshall Space Flight Center	Linda Jeter
PEP (MGBX)	Particle Engulfment and Pushing by Solidifying Interfaces Experiment	Dr. Doru Stefanescu	University of Alabama	Mischa Crouch
WCI (MGBX)	Wetting Characteristics of Immiscibles (WCI) Experiment	Dr. Barry Andrews	University of Alabama Birmingham	Mischa Crouch
CGH SACA (MSRR)	Coupled Growth in Hypermonotectics	Dr. Barry Andrews	University of Alabama Birmingham	Monica Hammond
PEP SACA (MSRR)	Particle Engulfment and Pushing by Solidifying Interfaces Experiment	Dr. Doru Stefanescu	University of Alabama	Monica Hammond
IPF (MSG)	Interfacial Pore Formation	Dr. Rohit Treviedi	Iowa State University	Linda Jeter
QMI (MSRR)	Quench Module Insert	Dr. Doru Stefanescu Dr. Barry Andrews	University of Alabama University of Alabama Birmingham	Monica Hammond



# TMI Customers

- **General Services Administration**
- **National Aeronautics and Space Administration**
  - Marshall Space Flight Center
- **US Air Force**
  - Maxwell AFB/Gunter Annex
  - Tinker AFB
- **US Marine Corp**
  - Marine Corp Systems Command
- **US Army**
  - Army Tactical Missile System Project Office
  - Corps of Engineers
  - Field Artillery School
  - Missile and Space Intelligence Center
  - Aviation and Missile Command (AMCOM)
  - Multiple Launch Rocket System (MLRS) Project Office
  - Program Executive Office for Missile Defense (PEO-MD)
  - Program Executive Office for Tactical Missiles (PEO-TM)
  - Missile Defense Agency
  - Space and Strategic Defense Command
  - Theater High Altitude Area Defense (THAAD) Project Office
  - Training and Doctrine Command (TRADOC)
  - Test, Measurement and Diagnostics Equipment Office
- **Commercial Customers**
  - American Apex
  - American Systems Corporation
  - Analytical Services
  - BAE Systems
  - C2 Technologies
  - Camber
  - CAS, Inc.
  - Computer Sciences Corporation
  - DRS-Radian
  - Dynamics Research Corporation
  - Eagle Group International
  - EDS
  - Future Research Corporation
  - GH Systems
  - FSCX, Inc.
  - General Dynamics
  - Innovative Energy Management, Inc.
  - Intelligent Decision Systems, Inc.
  - Lockheed Martin
  - Morgan Research
  - Northrop Grumman
  - Raytheon
  - Sigmatech
  - Smiths Detection
  - Solvern Innovations
  - Sumaria Systems
  - System Studies and Simulation, Inc.
  - Teledyne Brown Engineering
  - Will Technologies



# TMI Employee Demographics

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- TMI employs a staff of over 210 professionals
- Over 65% with degrees including 20% with advanced degrees
- Technical areas of expertise include aeronautical, mechanical, chemical and electrical engineering as well as biological and physical sciences
- TMI has a full range of support personnel including graphics specialists, trainers, multi media technicians, and technical writers

*Whatever you want to do, We'll help you fly.*

*But, if you're going to fly an experiment in the Microgravity Science Glovebox, contact TMI to share in our unique experience of building, integrating, and operating Glovebox payloads.*



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