

# HISTORIC OPPORTUNITY. DRAMATIC SAVINGS.

## YOUR TICKET TO MATERIALS RESEARCH ON THE FINAL SPACE SHUTTLE MISSION

Through the CREST-1 program from American Aerospace Advisors Inc. (AAAI), your research organization can now conduct materials experiments aboard the last scheduled Space Shuttle mission (STS-134) – at a very affordable cost.

Our Materials Dispersion Apparatus (MDA) provides a proven platform for microgravity research, having flown on six prior shuttle missions and six sounding rocket flights. And with up to 90 slots available on one mini-laboratory, the MDA radically reduces the cost to each participant.

As a result, it offers affordable access to space for scientists and engineers from academia, government, and industry, as well as student investigators.

## AN IDEAL ENVIRONMENT FOR EXPERIMENTATION

Earth orbit provides a unique environment for investigating the physical effects of gravity's absence on fluids, as well as the solidification and processing of organic and inorganic materials, among other applications.

For example, the MDA enables research on:

### Biomedical Research/Manufacturing:

- > Protein Crystal Growth
- > Protein Diffusion
- > Collagen Polymerization
- > Fibrin Clot Formation
- > Cell Biology
- > Microencapsulation of Drugs

### Fluid Physics:

- > Electrokinetic Transport
- > Fluid Mixing
- > Immiscible Phases
- > Miscible-Immiscible Liquid Behavior Studies
- > Wetting Studies

### Manufacturing Processes:

- > Ceramic/Polymer Membrane Casting
- > Electro-Optic Polymer Crystallization
- > Precipitation Morphology
- > Zeolite Crystallization

This is not an exhaustive list. Please contact American Aerospace to discuss your research requirements.



## A VERSATILE, PRECISE SPACE LABORATORY

The MDA is a commercial microgravity space processing laboratory that can mix up to 90 separate samples of any two or three fluids/solids at precisely timed intervals. It has been flight-qualified to two levels of containment.

The MDA operates by moving two blocks, which contain wells holding the experimental substances. Here's how the basic protocol works:

1. **Secured for launch:** The wells on the blocks are misaligned at launch, to keep the experimental fluids separated.
2. **Activated in orbit:** Shortly after achieving orbit, a crew member activates the MDA to align the blocks, allowing the fluids and/or solids to come into contact or mix.
3. **Secured for re-entry:** Prior to reentry, the blocks are again misaligned to secure the materials.

Eight different protocols are available. Please see the MDA Experiment Requirements document for details.

## FOUR MIXING METHODS

Based on your science protocol and the MDA's capabilities, you can incorporate one or more of these four mixing methods:

- > Liquid-to-liquid diffusion
- > Osmotic dewatering (analogous to vapor diffusion)
- > Magnetic mixing
- > Step gradient mixing





3rd Generation MDA Flown on Space Shuttle

## MDA CREST-1 MISSION SPECIFICATIONS

### Number of Data Samples Available

- > 90 Experiment wells/data points
- > Each well can contain up to 125 microliters ( $\mu$ l) of fluid.
- > Top block is fixed at 125  $\mu$ l per well, and the bottom block can be varied from 25 to 125  $\mu$ l in each well.

### Temperature Control

- > Shuttle/ISS shirt sleeve environment (no temperature control)

### Fluid Levels of Containment

- > Two or three, depending on experimental requirement to contain hazardous material

### Power Requirements

- > None (crewmember-activated)

### Scheduled Space Shuttle Mission

- > STS-134 (ULF6)
- > Launch target: February 2011
- > Scheduled time in orbit: 10 days

### Experiment Loading/Unloading Features

- > Late installation of experiment into MDA blocks
- > Late loading of MDA onto Space Shuttle
- > Early retrieval of samples upon Shuttle landing

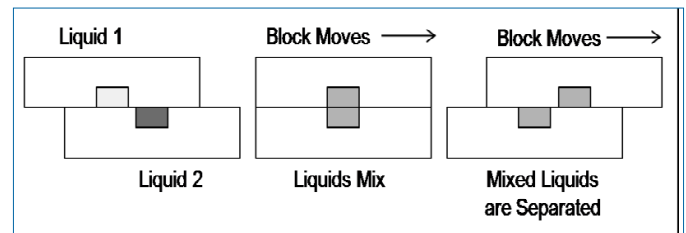
## CREST: A PROGRAM FOR THE FUTURE

AAA's CREST-1 (Commercial Reusable Experiments for Science and Technology) program is the first of several planned missions. By providing routine, low-cost access to space on a variety of government and commercial vehicles, the CREST program can help you unlock the value of a new experimentation and manufacturing environment.

## BE PART OF HISTORY

The final Space Shuttle mission is currently targeted for February 2011, and all reservations for the CREST-1 program must be made by August 2010.

For details and flight bookings on this historic mission, please call Alex Howerton at 267-421-6555, or e-mail [ahowerton@American-Aerospace.net](mailto:ahowerton@American-Aerospace.net).



*Principle of Block Operation for Mixing Fluids within the MDA. Please see MDA Experiment Requirements Document for a complete review of the many experiment protocols available.*



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