thermal control valves, and heat exchangers (HXs) that enables the transport of heat from the MMRTG to the rover electronics during cold conditions or from the electronics straight to the environment for immediate heat rejection during warm conditions. The second loop, called the Cruise HRS (CHRS), is thermally coupled to the RHRS during the cruise to Mars, and provides a means for dissipating the waste heat more directly from the MMRTG as well as from both the cruise stage and rover avionics by promoting circulation to the cruise stage radiators.

A multifunctional structure was developed that is capable of both collecting waste heat from the MMRTG and rejecting the waste heat to the surrounding environment. It consists of a pair of honeycomb core sandwich panels with HRS tubes bonded to both sides. Two similar HX assemblies were designed to surround the MMRTG on the aft end of the rover. Heat acquisition is accomplished on the interior (MMRTG facing) surface of each HX while heat rejection is accomplished on the exterior surface of each HX. Since these two surfaces need to be at very different temperatures in order for the fluid loops to perform efficiently, they need to be thermally isolated from one another. The HXs were therefore designed for high in-plane thermal conductivity and extremely low through-thickness thermal conductivity by using aluminum facesheets and aerogel as insulation inside a composite honeycomb core. Complex assemblies of hand-welded and uniquely bent aluminum tubes are bonded onto each side of the HX panels, and are specifically designed to be easily mated and demated to the rest of the RHRS in order to ease the integration effort.

This work was done by A. J. Mastropietro, John S. Beatty, Frank P. Kelly, Pradeep Bhandari, David P. Bame, Yuanming Liu, Gajanana C. Birur, Jennifer R. Miller, Michael T. Pauken, and Peter M. Illsley of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov. NPO-47619

Uniform Dust Distributor for Testing Radiative Emittance of Dust-Coated Surfaces

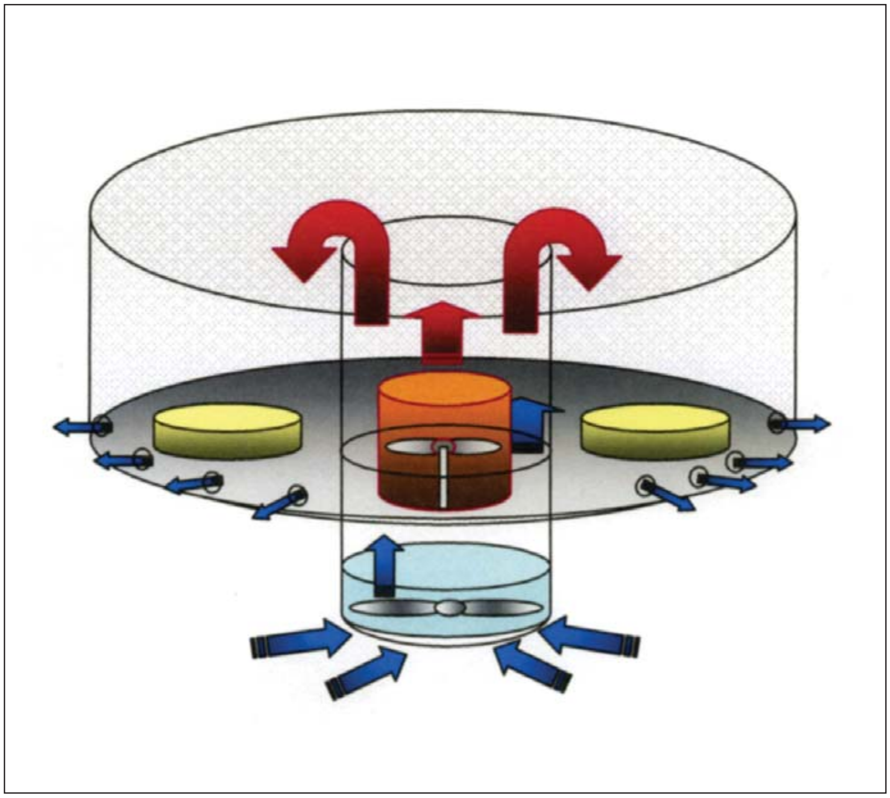
This device could be used in applying uniform amounts of dust on surfaces to which coatings may be applied.

Lyndon B. Johnson Space Center, Houston, Texas

This apparatus distributes dust (typical of the Martian surface) in a uniform fashion on the surface of multiple samples simultaneously. The primary innovation is that the amount of dust deposited on the multiple surfaces can be controlled by the time that the apparatus operates, and each sample will be subject to the same amount of dust deposition. The exact weight of dust that is added per unit of sample area is determined by the use of slides that can be removed sequentially after each dusting.

The objective was to produce the same weight of dust per unit sample area on each of eight samples that were part of an apparatus that measured the effective radiative emittance of dust-coated surfaces. The uniformity of dust deposition across all the samples was to be maintained as additional layers of dust were added. The unique nature of this problem is that the dust deposition was required to be spatially uniform on each sample, and deposited equally on all samples subjected to the dusting process. The dusting device also had to be movable so that after a dust layer is applied, the device could be removed and the samples could remain stationary in the experimental apparatus. In this way, the dust layer was not disturbed throughout the course of the experiments.

The dusting device comprises three parts: an aluminum sample table on which the samples are placed, a Plexiglas aerator tube that contains a fan and the dust aerator, and a chamber top for containment. The table supports the chamber top and the aerator tube as dusting is performed. The tube and the chamber top are removed after each dust layer is applied.



Schematic depiction of the **Dusting Apparatus**. Dust is placed in central reservoir (orange container). The impeller on the bottom (blue) creates an air/dust suspension, which rises slowly (red arrows) in the tube surrounding the reservoir. The suspension settles on the coupons (yellow) below.

Test samples are arrayed uniformly around the table and the hole in the center admits the aerator tube and assures repeatable vertical alignment. A groove around the periphery of the table allows repeatable alignment of the chamber top with the table. Microscope slides are placed between samples on the table so that once dusting has been performed, they can be removed and weighed to determine the weight of dust per unit area added to the samples. As additional dusting is done, additional slides are removed and weighed so that the amount of dust that accumulates with multiple dustings can be determined.

This work was done by Kathryn Miller Hurlbert of Johnson Space Center, and Larry C. Witte and D. Keith Hollingsworth of the University of Houston. Further information is contained in a TSP (see page 1). MSC-23944-1

MicroProbe Small Unmanned Aerial System

Goddard Space Flight Center, Greenbelt, Maryland

The MicroProbe unmanned aerial system (UAS) concept incorporates twin electric motors mounted on the vehicle wing, thus enabling an aerodynamically and environmentally clean nose area for atmospheric sensors. A payload bay is also incorporated in the fuselage to accommodate remote sensing instruments.

A key feature of this concept is lightweight construction combined with low flying speeds to minimize kinetic energy and associated hazards, as well as maximizing spatial resolution. This type of aerial platform is needed for Earth science research and environmental monitoring. There were no vehicles of this type known to exist previously.

This work was done by Geoffrey Bland and Ted Miles of Goddard Space Flight Center. GSC-16206-1