RESOLVE (Regolith & Environmental Science & Oxygen & Lunar Volatile Extraction) Project

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Abstract

The RESOLVE Project is a lunar prospecting expedition whose primary goal is to characterize water and other volatiles in lunar regolith. RESOLVE consists of LAVA, OVEN, Avionics, Software, Thermal and Structures Subsystems. The Resource Prospector will be sent to prove that water can be accessible on the moon and other planetary bodies. The rover will look for essential gases inside of craters, where the remains of comets (made of ashes, dust and ice) will be located. The rover will drill into the lunar soil to extract soil, which will then be heated inside the OVEN subsystem. This will release gas particles into a streamline to lead to the ST/NIRST, which will then vent molecules to the SDS/GC-MS and WDD.

Background Information

RESOLVE is a lunar prospecting expedition whose primary goal is to characterize water and other gas volatiles in lunar regolith. RESOLVE consists of LAVA, OVEN, Avionics, Software, Thermal and Structures Subsystems. The Resource Prospector will be sent to prove that water can be accessible on the moon and other planetary bodies. The rover will look for essential gases inside of craters, where the remains of comets (made of ashes, dust and ice) will be located. The rover will drill into the lunar soil to extract soil, which will then be heated inside the OVEN subsystem. This will release gas particles into a streamline to lead to the ST/NIRST, which will then vent molecules to the SDS/GC-MS and WDD.

Experiments and Design

The FSS is currently in the engineering testing unit phase, which is posed to help further improve design reliability for the Fluid Subsystem. The ETU integrated manifold will help control the manifold system from temperature observations. The ETU testing phase.

Results and Findings

Results and Findings (Cont.)

Pressure Transducer Qualification Testing

The PT testing comprised of taking the experimental setup and utilizing pressure changes in conjunction with temperature changes. The PT’s are used as pressure monitors inside of the manifold, while the rover is running. Temperature will be kept constant, while the pressure of the system is changed.

Heat Wrap Analysis Testing

• The goal during the heat wrap analysis test is to determine the most efficient method to heat trace 1/8th inch stainless steel tubing that minimizes heat loss and uneven heat distribution. Thermal profile will help to determine the cooler spots along the tube, where the RTD’s will be placed.

Mini-Manifold Thermal Profile Testing

• The goal of the Mini-Manifold Test is to determine if the 6th piece of tubing is able to reach a certain temperature with either the line and/or manifold heaters turned on. The experiment also shows any temperature inconsistencies across the tube.

Conclusion

RESOLVE may lead an essential exploratory expedition in the future and humankind missions of extraterrestrial bodies that utilizes resources from surrounding planetary bodies. With a growing interest from NASA, RESOLVE may be one of the possible solution to assist in humankind’s exploration across the galaxy.

References


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