

New mission to collect, return Martian samples

January 20 2006



The first step of any journey takes place in your mind, they say. If this saying is true, a team of Texas A&M University student engineers is well on the way to Mars.

Working with design experts at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., the student engineers have worked out the parts and processes needed to send two landers the 100 million miles to Mars, land them, take samples of soil, rock and atmosphere, and return the samples safely to Earth. The samples will then be distributed to hundreds of research labs to see if they can detect signs of past or present life on Mars.

"A project like this is almost unbelievably complex," said Dr. David



Hyland, a professor of aerospace engineering at Texas A&M who initiated and supervised the yearlong project. "It is complex, but modern engineering projects often are very involved and this project gives our student engineers an important opportunity to find out what it's like to work in this kind of environment."

As the student engineers envision it, the project would take off in late 2015 with the launch of an Atlas V rocket carrying a spacecraft destined for Mars. That spacecraft would, in turn, carry two landers that would parachute to locations on opposite sides of the red planet. Another rocket, a Delta iv Heavy, launched a year later, would fly an Earth Return Vehicle (ERV) to Mars. Then the ERV will carry samples collected by the two landers back to Earth.

Once on Mars, the two landers -- one landing on an ancient flood site known as Eos Chasma and the other in a large flat basin called Isidis Planitia -- would release wheeled rovers carrying automated tools to collect samples of soil, rock and atmosphere.

When the rovers have collected their samples -- a total of 500 grams (a little more than a pound) -- they will return to their landers, where the samples will be transferred to small launch vehicles that will carry them into a low Mars orbit. In orbit, the launch vehicles will meet the second Earth-launched spacecraft, the Earth Return Vehicle, and transfer the loads of soil, rock and atmosphere to it. Then the spacecraft will return to earth, carrying the samples.

The student engineers worked with design experts at the Jet Propulsion Laboratory and traveled to JPL's Pasadena campus to use a suite of stateof-the-art design workstations to refine their early design concepts. The array of computers allows each design team to communicate its modifications instantly to every other design group. This saves time and helps ensure all parts of the design fit together smoothly. The design



facility is routinely used by JPL's "Team X," a group of engineers and scientists responsible for design of all advanced deep space missions. In recognition of their accomplishments, the students were declared honorary Team X members.

In addition to tasks like calculating the weight and size of the payload each rocket can carry into orbit and designing the Mars-bound spacecraft, landers, rovers and research equipment to fit into it, the students also explored problems such as the most effective way to land the rovers on Mars and how to get them back into orbit when they have accomplished their tasks.

As an example of the complexity of the problems the student engineers had to deal with, Hyland pointed to the need to provide fuel to power the launch vehicle that would carry the samples from the surface of Mars into orbit.

"They couldn't take enough fuel with the landers to get back into orbit," Hyland said. "So they designed a small chemical plant that would extract oxygen and methane for fuel from the gases we know are in the Mars atmosphere. This was viewed as a significant advance and may well be included in JPL's final design concept"

This kind of student design project fits neatly into Texas A&M Engineering's emphasis on space engineering, says Dr. G. Kemble Bennett, vice chancellor and dean of engineering.

"Dean Bennett deserves our sincere thanks for providing the encouragement and time needed for us to carry through this project, which has been so beneficial for the students," Hyland said.

Source: Texas A&M University



Citation: New mission to collect, return Martian samples (2006, January 20) retrieved 27 April 2024 from <u>https://phys.org/news/2006-01-mission-martian-samples.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.