Mars Drilling Tests Will Seek Knowledge And Resources

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Geologists, biologists and archaeologists for years have used core samples to look back in time, tunneling through layers of soil and stone to study history. NASA engineers are taking this veteran technique into the future with a design that can bore into other planets using just a light bulb's worth of power.

This month they will drill more than six feet deep into the tundra of the Canadian Arctic with a futuristic tool that is a cross between an oil rig and a portable household drill, making it ideal for space exploration.

The research team is spending the next two weeks testing the drill at the Eureka Weather Station on Ellesmere Island in Canada's Nunavut province, about 690 miles from the North Pole. The outpost is on a vast, ice-covered landscape, buffeted by frigid winds and sub-zero temperatures.

The conditions are in some ways similar to those found on the moon and Mars. The team will gather dozens of core samples that Canadian geologists will use to learn more about the geology and biology of the icy island.

A similar drill may one day be used by astronauts to bore into the polar caps of Mars in search for water, other resources and the evidence of habitability. These types of drills and other drill technology under development will also be a feature of early robotic precursor missions to human exploration.

The drill was conceived by engineers at NASA's Johnson Space Center and Baker Hughes Inc., both in Houston. It should ultimately be able to plunge to depths of several hundred yards using power generated by solar arrays or an atomic battery.

"Lab tests are important, but we learn so much more from the extremes faced in field testing," said Johnson's Jeffrey George, manager of the Planetary Drill Project.

Surprises are expected. During an October 2004 expedition with an earlier prototype, the team encountered a scavenging polar bear. More important, they learned the extreme cold caused a polymer fitting in the drill to contract differently than its metal counterpart, temporarily slowing the drill.

Since the drill is designed to be carried on spaceships, it has weight, size and power consumption limits according to George. At 30 pounds, the drill is heavier than a workshop drill, but lighter than the smallest standard ground drilling rig, making it portable and easy to handle.

The drill consists of a control box, support structure and the drill itself. The six-foot-long, 1.75-inch diameter drill is housed inside a metal tube, called a spud tube, a nod to the oil field term spudding, meaning to bore into a new well.

The drill is lowered into the bore hole by its tether. The drill follows the auger bit down and is periodically pulled to the surface to remove the core and drill cuttings. A laptop computer is connected to the control box to send commands and record data.

The project is a cooperative effort among Johnson, NASA's Ames Research Center, Moffett Field, Calif., and with faculty members from McGill University in Montreal.