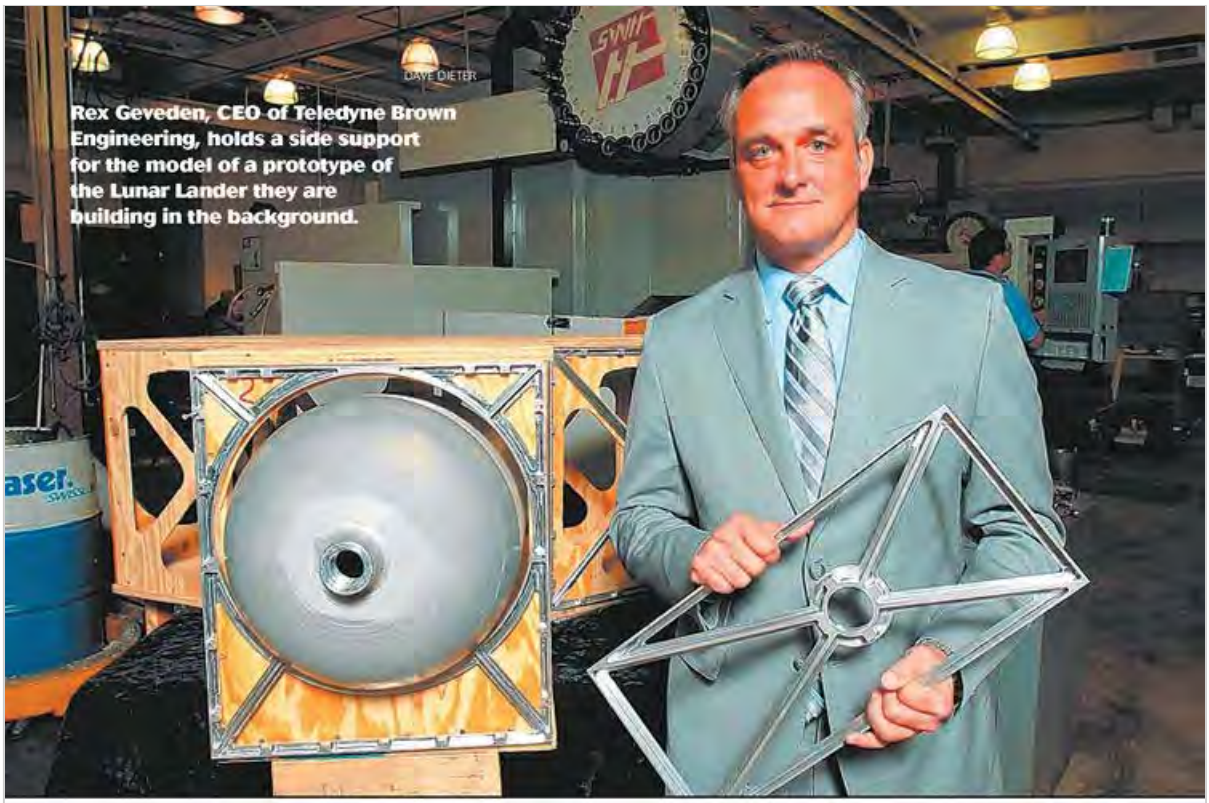


Scouting party

Group of landers being designed in Huntsville will check out the moon before astronauts arrive

By KIMBERLY BALLARD

In a Huntsville warehouse sits an object that looks like three wooden crates nailed together to form a short, squat tripod with no legs, relatively hollow in the center, but with all sorts of holes and die cuts that hint something will eventually fit into that empty space. Overall, it is about the height of a coffee table and as big around as a game table.

It is actually typical of how Teledyne Brown Engineering (TBE) goes about these projects. This one may have started as a pen and ink drawing on a paper dinner napkin. It is a demonstrator prototype for a robotic lunar lander that TBE is building here in Huntsville using an integrated propulsion system designed by Orion Propulsion.

Once completed, a system of these landers on the moon will act something like a team of surveyors and geologists, relaying data that will help determine what types of building activity could take place there.

According to Jeff Howard, director of space exploration systems at TBE, this robotic lander is part of an International Lunar Network (ILN), a cooperative effort between the U.S. and international partners designed to coordinate individually six to eight lunar landers simultaneously in a geophysical network on the

lunar surface.

"Each node will provide a minimum core suite of two instruments with a scientific objective to study the moon's surface and its composition," Howard says. Expected to begin operating in late 2013 to 2014, the cooperative is guided by the Von Braun Center for Science and Innovation (VCSI). It has purely exploratory goals, and the robotic landers' instruments will provide much-needed information prior to the launch of the manned Altair Lander, which is scheduled to blast off aboard the Ares V rocket sometime around 2020, rendezvous with the Ares I carrying a seven-man crew, and leave Earth's orbit to eventually land on the moon.

Mike Soutullo says the moon is imperative to the future of manned space exploration. "The moon is a stepping stone to Mars," says Soutullo, TBE's aerospace chief engineer. "The Earth's gravity is six times stronger than that of the moon." In other words, launching a mission to Mars from the moon rather than Earth would theoretically be six times easier, using one-sixth of the power it takes to launch a spacecraft.

According to Tim Pickens, Orion Propulsion's chief executive officer, NASA and VCSI have an ongoing project to send probes and satellites to the moon over the next five to 10 years, specifically to more intensely study its surface from above.

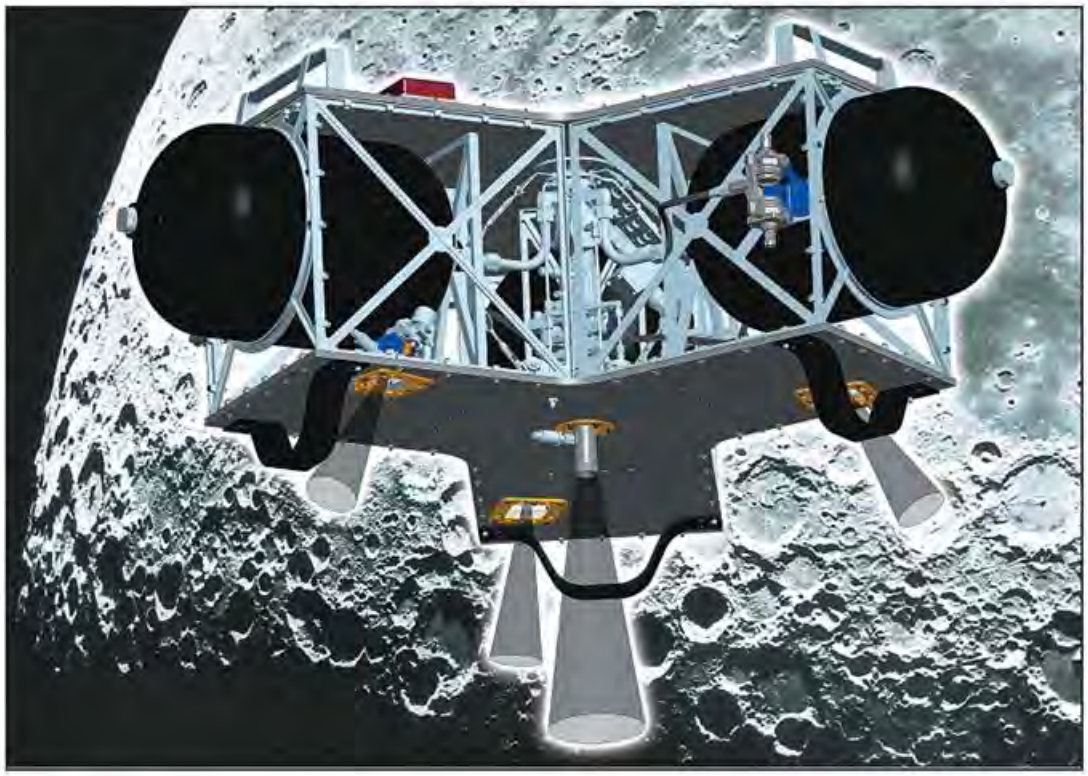
Soutullo believes there may very well be materials in moon dust and rocks that are suitable for refining and building on the surface of the moon, rather than transporting materials from Earth. "What if new technology proves there is ice below the surface, signs of water or remnants of carbon? That would change our perspective significantly," he says.

"NASA's objective is to build an International Lunar Network, where many great minds from around the world are gathering and analyzing data about the moon and its possibilities," says Mike Ogles, TBE vice president of aerospace systems. "We cannot get to Mars without knowing more about the moon. We need to be able to go and plan to stay for a while. It is a platform from which we can make the greater leap.

"This is exciting because the Constellation program will be the first developmental flight for NASA in 40 years," says Ogles. "The work we are doing now on the demonstrator is part of a long-term program expected to place a crew on the moon by 2020 and this time, give us the ability to stay for a while."

Currently in its manufacturing stage, the lander is no more than a series of metal pieces, but once constructed this spring and early summer, it will be somewhat reminiscent of the older Apollo Lunar Landers, but in a lighter weight three-legged version.

The early Apollo landers sat down on the moon's surface on four legs rather



than three, and with a significantly harder impact than was expected. The talcum powder texture of the moon's surface caused significant systems problems arising from the great cloud of dust created during those landings.

It is important that the new-generation landers touch down more gently. "The landers used in the ILN program will be carrying highly sensitive instruments for studying the moon's interior structure and composition, as well as meteorological equipment," Howard says.

Late this summer at Marshall Space Flight Center, TBE and Orion Propulsion will test the demonstrator's flight performance and ability to hover using one of three possible propulsion gases. Tests will begin with a cold air gas. Unlike the original Mars Rover that dropped onto the Martian surface in a gigantic protective balloon, future moon landers will sit down gently on the surface after hovering for 10 seconds to help eliminate the clunky landings of the Apollo missions.

"The ability to hover will reaffirm our ability to control the flight from the onboard command center and ascertain that the brain is communicating with the rest of the body," says Soutullo. The cold air gas uses no fuel, but future testing will include two gases that can produce a hot gas stream, hydrogen peroxide and a form of methane gas. "A hot gas system will allow us to go hotter and faster," says Soutullo.

For a small company like Orion Propulsion, this is a huge project. "I call this rapid development at its best," says Pickens. "We will have designed, built and delivered an entire propulsion system for the Lunar Lander Test Bed in just 14 weeks."

"This project shows the exceptional level of teamwork available here in North Alabama," says Ogles, "You have Marshall, UAH, the National Space Science and Technology Center (NSSTC), the Von Braun Center for Science and Innovation (VCSI), Orion Propulsion, and Teledyne Brown sitting right in the middle of it all, working together to make history." ■