

SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)

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TEAM ROCKET CITY SPACE PIONEERS – AN INDUSTRIAL APPROACH TO THE GOOGLE
LUNAR X PRIZE COMPETITION**Abstract**

The Rocket City Space Pioneers (RCSP) is a partnership of four U.S. businesses and three large non-profit organizations. The team was formed to prove that robotic space exploration can be an affordable and sustainable commercial endeavor. Our innovative, minimal risk approach utilizes our partners' deep experience in flight proven heritage hardware coupled with our integrated Falcon 9 rideshare approach. In an effort to share the burden of robotic space exploration architecture development, we strive to maintain a diversified portfolio of industrial partners – representing the best in class in propulsion, structures, guidance, navigation and control, avionics and spacecraft systems integration. Our leader, Tim Pickens, was the lead propulsion engineer for the Ansari X PRIZE-winning SpaceShipOne team. RCSP has obtained several large sponsorships and was selected as one of only three teams to supply data to NASA's Innovative Lunar Demonstrations Data Program. The Rocket City Lander/Rover is targeted for launch in the 1st quarter of 2014 on a Falcon 9 rocket from Cape Canaveral Air Force Station using a rideshare arrangement brokered by Spaceflight Services Inc. The Falcon 9 can place approximately 3,600 kg into a geosynchronous transfer orbit (GTO) orbit. The mission will include a primary payload, an EELV Secondary Payload Adapter (ESPA) ring with up to 5 secondary payloads and an innovative propulsive ESPA tug with three rideshare payloads including the Rocket City Lander. Once in LEO or GTO, the primary payload will be deployed along with the 1st set of secondary payloads. The ESPA Tug with three remaining payloads will then separate from the Falcon 9 second stage and the ESPA will conduct a translunar injection (TLI) burn. Upon arrival at the Moon, the propulsive ESPA Tug performs a lunar orbit insertion (LOI) burn. Once in lunar orbit, the ESPA Tug deploys the remaining two rideshare payloads and the Rocket City Lander. Lander, once separated from the ESPA Tug, begins a controlled descent burn and then lands softly on the lunar surface with a rover weighing up to 10 kg. Several landing sites have been explored, including the rim of the Shackleton Crater at the South Pole, the rim of the Tycho crater and several Apollo 11 sites – the current focus is on former Apollo equatorial sites. This paper will describe the status of the rideshare program and development status including on-going risk mitigation demonstrations in lander and ESPA tug propulsion and guidance, navigation and control.