

Return to the Moon (02)
Goals and Status of Future Lunar Missions (2)

Author: Prof. Michèle Lavagna
Politecnico di Milano, Italy, michelle.lavagna@polimi.it

Prof. Amalia Ercoli Finzi
Politecnico di Milano, Italy, finzi@aero.polimi.it

Prof. Gianfranco Chiocchia
Politecnico di Torino, Italy, gianfranco.chiocchia@polito.it

Mr. Piero Messidoro
Thales Alenia Space Italia, Italy, piero.messidoro@thalesalieniaspace.com

Dr. Andrea Sacchetti
OHB Italia SpA, Italy, cpini@cgspace.it

Dr. Maria Antonietta Perino
Thales Alenia Space Espana, Italy, mariaantonietta.perino@thalesalieniaspace.com

Dr. Christian Circi
Italy, christian.circi@uniroma1.it

Mr. Giuseppe Capuano
Techno System Developments S.R.L., Italy, gcapuano@tsdev.it

Prof. Enrico Flamini
Italian Space Agency (ASI), Italy, enrico.flamini@asi.it

Mr. Carlo Del Vecchio Blanco
Italian Space Agency (ASI), Italy, bcdelvec@unina.it

Prof. Luigi Schirone
Sapienza University of Rome, Italy, luigi.schirone@uniroma1.it

ITALY AS A COMPETITOR FOR THE GOOGLE LUNAR X PRIZE: THE AMALIA MISSION

Abstract

The XPrize Foundation together with Google, proposed in 2007 a very hard challenge to privates: to send a robot on the Moon surface within December 31, 2014 which is asked to cover at least 500 m reporting through both videos and images its walk on the surface. The whole mission must be privately funded at 90. Currently twenty official teams are competing for the prize, coming from all over the world both national and international. Italy is answering to this call with the AMALIA mission (Ascensio Machinae Ad Lunam Italica Arte): the team, completely Italian, is composed of major Italian Aerospace Engineering Universities and national space industries: Politecnico di Milano, Politecnico di Torino, Università di Roma “La Sapienza”, Università di Napoli “Federico II”, for the academic participation and Thales Alenia Space-Italia SpA, Carlo Gavazzi Space SpA and TechnoSystem Development SpA for the industrial side. These entities have already an impressive track record in contributing to and developing space exploration and planetary missions for the Italian and the European Space Agencies. The AMALIA mission baseline sees a lander vehicle releasing a wheeled rover on the Moon surface; the lander vehicle plays the cargo role for the Earth-Moon transfer too. The vehicles design is driven by the mass minimization to limit launch costs: therefore miniaturized hardware components are exploited; redundancy is applied only where strictly needed to contain the mission risks. The launcher selection is under evaluation, having in mind the technical constraints satisfaction together with the costs limitation

goals. Chemical propulsion currently represents the design solution to control both the transfer trajectory and the landing phase with a specific thrusting profile to cope with fuel mass minimization and thruster throttling limitations. The selected landing site is equatorial. A four wheels rover with specifically designed suspensions will be released on the surface; navigation will be accomplished by merging classic and visual odometry supported by three cameras mounted on a mast; those cameras will also supply data required to answer challenge official requirements. On board autonomy is limited, leaving the authority to the Ground. A prototype of the vehicle is currently under development. Deeper details on the Team Italia technical work so far, sponsorship recruitment and AMALIA mission peculiarities are offered in the paper.