UNISEC-Global

The 9th Mission Idea Contest: To The Moon

Mission Requirements Document

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1.1   Document Purpose

This document defines the mission requirements for the MIC9. It is intended to be used by MIC9 contestants in the design of their mission ideas.

1.2   Documents and acronyms

1.2.1   Reference documents

Reserved

1.2.2   Applicable documents

Reserved

1.2.3   Acronyms / Abbreviations

Acronyms/Abbreviations	
LOCM	Lunar Orbit CubeSat Mission
LSRM	Lunar Surface Rover Mission
MIC	Mission Idea Contest
MIS	Mission
REQ	Requirement

2 MIC9 CONTENTS: LUNAR ORBIT CUBESAT MISSION AND LUNAR SURFACE ROVER MISSION.

UNISEC-Global is pleased to announce the 9th Mission Idea Contest seeking exciting ideas for lunar orbit and rover missions. The selected lunar mission ideas will be presented at the contest.

The lunar missions consider the use of one or more CubeSats placed into lunar orbit or one or more rovers deployed on the lunar surface. Designs are encouraged to demonstrate originality, impact, engineering elegance, and feasibility.

The requirements presented in this document are the top-level driving mission requirements for mission designers in order to specify and design either a:

- Lunar Orbit CubeSat Mission (LOCM) - Section 3; or
- Lunar Surface Rover Mission (LSRM) - Section 4.

3 REQUIREMENTS FOR THE LUNAR ORBIT CUBESAT MISSION.

3.1 Mission Objectives

MIC9-MIS-REQ-0001

The mission designer shall select and define mission objectives.

3.2 Size, Mass form factor and constellation size

MIC9-MIS-REQ-0002

The mission shall comprise at least one spacecraft in lunar orbit with a maximum of 12U CubeSat in total across the constellation.

3.3 Injection Orbit

MIC9-MIS-REQ-0003

The launch and lunar transfer vehicle will be responsible for the spacecraft's orbit insertion. The mission designer shall select either of the following injection orbits from which mission AOCS operations shall commence.

Insertion orbit option 1) **Low Lunar Orbit**

- Altitude of Perilune: Ø rp: 100 km
- Altitude of Apolune: Ø ra: 100 km
- Inclination: 80° to 100°

Insertion orbit option 2) **Elliptical Lunar Orbit**

- Altitude of Perilune: Ø rp: 100 km
- Altitude of Apolune: Ø ra: 1,200 km or 6,000 km
- Inclination: 80° to 100°

3.4 Communication

MIC9-MIS-REQ-0004

Communication between the mission operation ground segment and the space segment may be either:

Option 1) Direct communication with the Earth; or

Option 2) Relay communication with Earth.

3.5 Passivation, End of Life and Sustainability.

MIC9-MIS-REQ-0005

All spacecraft energy and power sources shall be passivated at the end of life.

MIC9-MIS-REQ-0006

The mission designer shall consider the impact of the decommissioning and disposal method in the scope of the lunar environment.

3.6 Mission Duration

MIC9-MIS-REQ-0007

The mission designer shall define the mission duration whilst considering the relevant constraints of any supporting infrastructure.

3.7 Cost Estimation

MIC9-MIS-REQ-0008

The mission designer shall be accountable for the costs associated costs of satellite engineering, procurement, Assembly, Integration and Test.

MIC9-MIS-REQ-0009

The mission designer shall not be accountable for the launch and transportation costs, deployer-related costs, and deep space communications service.

3.8 Schedule

MIC9-MIS-REQ-0010

The mission designer shall plan for the development schedule and milestones.

3.9 Other requirements

None.

4 REQUIREMENTS FOR THE LUNAR SURFACE ROVER MISSION.

4.1 Mission Objectives

MIC9-MIS-REQ-0011

The mission designer is free to select and define mission objectives by utilising a lunar rover/convoy. Rover technology demonstration is not a permitted objective.

4.2 Size, mass form factor and convoy size

MIC9-MIS-REQ-0012

The mission shall comprise at least one rover with a maximum convoy mass of 10kg delivered to the surface. This shall not include the mass of the delivery or deployment mechanism, which will be accounted for and provided by the landing vehicle.

4.3 Landing Site

MIC9-MIS-REQ-0013

The mission designer shall nominate the landing site.

4.4 Communication

MIC9-MIS-REQ-0014

Communication between the mission operation ground segment and the rover may be either:

Option 1) Direct communication with the Earth; or

Option 2) Relay communication with the Earth via the lander.

MIC9-MIS-REQ-0015

If communication with the lander is employed then communication with the lander shall be wireless.

4.5 Passivation, End of Life and Sustainability.

MIC9-MIS-REQ-0016

All rover energy and power sources shall be passivated at the end of life.

MIC9-MIS-REQ-0017

The mission designer shall consider the impact of the decommissioning and disposal method in the scope of the lunar environment

4.6 Mission Duration

MIC9-MIS-REQ-0018

The mission duration shall be up to 1 lunar day

4.7 Costs

MIC9-MIS-REQ-0019

The mission designer shall be accountable for the costs associated costs of rover engineering, procurement, Assembly, Integration and Test.

MIC9-MIS-REQ-0020

The mission designer shall not be accountable for the launch and transportation costs, deployer-related costs, and deep space communications service.

4.8 Schedule

MIC9-MIS-REQ-0021

The mission designer shall plan for the development schedule and milestones.

4.9 Others

MIC9-MIS-REQ-0022

Autonomous operation can be considered as optional.

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