

Statement of Purpose

Towards a tether based freight delivery infrastructure between Earth and Moon

Project Supervisor: Professor Matthew Cartmell

Group Members:

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David MacDiarmid
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Project Aim

The project aims to construct a mission architecture for the bi-directional transportation of 1000 kg of freight between the Earth and the Moon utilising Motorised Momentum Exchange Tethers (MMETs). Current tether propulsion concepts and technologies will be explored. The use of rocketry and high altitude balloon technology to lift the freight from the surface of the Earth to the Lower Earth Orbit (LEO) will be examined for a feasible integration with the tether system. The freight will then be propelled from the LEO by a large Earth based tether (eMMET) to a tether situated in the Lower Lunar Orbit (LLO) of the Moon (IMMET). The freight will then be lowered to the lunar surface by way of a Lunavator, using powered descent or otherwise.

Throughout the project the cost and environmental impact of the tether system will be estimated. This, along with the performance of the system, will be compared with the current method of conventional rocket thrust propulsion (directly between Earth and Moon) and the findings discussed.

Finally, the mission architecture will be assessed to determine how sustainable the concept would be and when it would be realistically possible to implement such a system.

Deliverables

1. To develop a comprehensive understanding of existing information on the subject. This will be presented in the form of a literature review within the interim report.
2. Development of a practical and sustainable method for Earth to LEO freight transport. The final method will be agreed upon between group and supervisor.
3. Development of a practical and sustainable method for LLO tether to Lunar surface freight transport. The final method will be agreed upon between group and supervisor.
4. Technical details of the orbital exchange path of the freight between eMMET and IMMET. This will be presented to supervisor at an intermediate phase of the project. (December 2016)
5. An estimation of the cost and a comparison to alternative methods to measure the benefits of the tether system.
6. Discussion of the benefits of the existence of a tether system.
7. An estimation of the potential environmental impact the tether system would have.
8. Analysis of the logistics that would need to be in place for the system to function once in operation.
9. Final product - A report presenting the final conclusions on the feasibility and effectiveness of an Earth to Moon tether transport system.

Member Roles & Responsibilities

Group Member	Roles and Responsibilities	
	Project Management	Technical Role
<i>Abhishek Thapa</i>	Meeting Notes/Timekeeping	Earth's Surface to LEO
<i>David MacDiarmid</i>	Logbook/File Organisation	Interplanetary Transfer
<i>Ross Macdonald</i>	Task Allocation/Gantt Chart	LLO to Lunar Surface
<i>All Members</i>	Report Writing	Final Method Decisions; Cost Analysis; Environmental Impact; Comparison; Website Design