Microrover Flight Experiment (MFEX)
Mechanical Design Guidelines Document (MDGD)

1.0 Scope

This document covers guidelines and assuptions which are to be used in all design and analysis work undertaken by the MFEX Mechanical Subsystem

2.0 General

Rover mass: 8 kg
Wheels: 6 ea., 130 x 60 mm (contact width)
Stowed static envelope: 600 x 460 x 180 mm (300 mm deployed)
Lifetime:
- Mission: 100m earth, 100m Mars
- Qualification: 1km earth, 1km Mars
- Design Goal: 1km earth, 10 km Mars

Speed: 8-17 mm/s (0.5 - 1.0 m/min)

3.0 Loads

Launch: Delta II - assumed to be minor compared to landing loads
Landing: Airbags

50 g static airbag landing design requirement is considered limiting loads for cruise configuration rover. Use 150 g's in preliminary stress and loads calculations. No dynamics have been provided. (Loads will be refined based on Lander structural model and loads analyses.

Roving: up to half vehicle weight per wheel in obstacle climbing conditions

4.0 Thermal:

Exterior components:

Flight Operating temperature:	-90°C to + 15°C (performance specs)
Qualification Operating temp:	-110°C to + 35°C (survival only)
Non-operating temperature:	-110°C to + 85°C

Warm Electronics Box:

Design operating temp:	-40°C to + 50°C (performance specs)
Qualification Operating temp:	-55°C to + 60°C (survival only)
Non-operating temperature:	-65°C to + 85°C

5.0 Mobility

Torque (Nm)/wheel:			
	Roving, Mars:	0.1	
	Roving, Earth:	0.3	
	Obstacles, Mars:	1.0	
	Obstacles, Earth:	3.0	
	Stall, minimum:	4.0	(Rocky 4 is 2.6 Nm/wheel)

Assume obstacles are encountered over 5% of the driving distance for power calculations and planning and 10% for qualification testing.