Daedalus

Mechanical Design

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Design Considerations

Use constraints imposed by future lunar mission

- Use space qualifiable components and concepts
- Restrict size to fit available launch vehicles

Perform analyses a priori to optimize design

Use concurrent systems engineering philosophy

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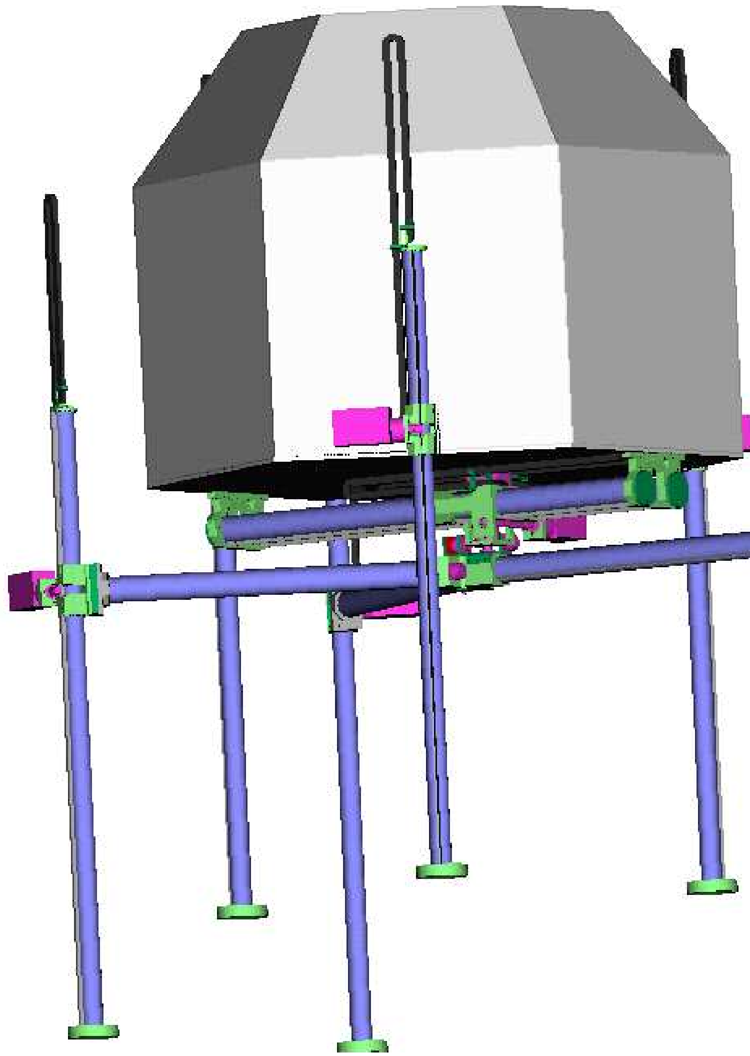

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Daedalus Specifications

Mass	200 kg
Locomotion mass fraction	25 %
Nominal speed	5 m/min
Locomotion power	45 W @ 5 m/min
Mechanism DOF	8
Stowed volume	1.5 m dia x 1.5 m
Max vertical step	1.2 m
Max ditch	1.0 m
Maximum slope	25^{o}

Integrated Lander/Rover

Maximizes resource sharing of flight critical systems

Delivers larger payloads for given launch vehicle

Increases useful delivered payload mass fraction

- Artemis (as proposed): < 25 %
- Daedalus concept: > 80 %

Simplifies launch vehicle integration

Eliminates need for rover deployment

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Walking Robots

Works well with integrated lander/rover concept

Shares characteristics with traditional landers

- **Wide stance improves landing stability**
- **High ground clearance**

Locomotes effectively in rugged terrain

- **Marginal footholds avoided**
- **Footholds tested before used**
- **Efficient in soft materials**
- **Body isolated from underlying terrain**

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Orthogonal-Legged Frame-Walker

Provides robust, easily controlled system

- Simple, inherently stable mechanism
- Decoupled body support and propulsion
- Shank-rocking problems eliminated
- Actuator conflict potential minimized
- Capability to turn in-place
- Maximum obstacle clearance equal to leg length

Moves at nominal speed in rugged terrain

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Maximizes available launch vehicle payload utilization

Utilizes redundant components

Provides large, on-board payload capability

Accomodates a variety of scientific instrumentation

Incorporates all systems required for autonomy

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