Rocket Propelled Wind Tunnel

**Design Goals**
- Achieve stagnation temperature flow for 30s at Mach 3.0 seconds at Mach 3
- Measure drag and lift on a test subject
- Deploy wings and actuate control surfaces to glide vehicle back to launch location
- Use a weather balloon and a tethered launch platform to launch the vehicle at an altitude of 70,000 feet

**Rocket Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Speed</td>
<td>Mach 3</td>
</tr>
<tr>
<td>Thrust</td>
<td>11,000 N (avg)</td>
</tr>
<tr>
<td>Mass</td>
<td>60 kg (dry), 240 kg (wet)</td>
</tr>
<tr>
<td>Launch Altitude</td>
<td>20 km</td>
</tr>
</tbody>
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**Future Tasks**
- Propellant grain geometry and composition
- Nozzle throat erosion effect on engine performance
- Control of balloon ascent
- Lateral stability for autopilot
- Full scale test stand design

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**Recovery & Flight Planning**

Mach contour of rocket with airbrakes deployed.

**Wind Tunnel Test Section**

Isometric cutaway view of wind tunnel test section.

**Solid Motor Design & Testing**

Scaled solid motor test stand

Mach contour of rocket nozzle flow

**Rocket altitude prediction**

![Rocket altitude prediction graph](image)

**Pressure contour of wind tunnel test section**

![Pressure contour](image)