AZμL- AZores Micro Launcher
DEIMOS and ORBEX

ESA Micro-Launch Services Workshop
Paris, 6 November 2018
Introduction - Orbex Prime from the Azores
Introduction – European launcher family

Nominal 150kg to 500km SSO
Launched from Europe

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Payload to LEO (kg)</th>
<th>Launch Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orbex Prime</td>
<td>150</td>
<td>Europe</td>
</tr>
<tr>
<td>Vega</td>
<td>1500</td>
<td>French Guyana</td>
</tr>
<tr>
<td>Soyuz</td>
<td>7000</td>
<td>French Guyana</td>
</tr>
<tr>
<td>Ariane 5</td>
<td>16000</td>
<td>French Guyana</td>
</tr>
<tr>
<td>Ariane 6</td>
<td>20000</td>
<td>French Guyana</td>
</tr>
</tbody>
</table>
Introduction – Deimos / Orbex Partnership

- Deimos: preferred GNC & Ground System provider
- Orbex: preferred Launch Services Provider for Deimos satellites
Value Proposition

- Fully European end-to-end launch service
- Two launch sites envisaged for greater flexibility and availability
- Open lean Azores spaceport with multiple launchers
- Green launcher with renewable, ultra low carbon fuel
- Highly compatible with local environment
- Optimised launcher architecture
- Easy to transport
## Launch vehicle concept

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>1.3 m</td>
</tr>
<tr>
<td>GLOW</td>
<td>18000 kg</td>
</tr>
<tr>
<td>Structure</td>
<td>Composite</td>
</tr>
<tr>
<td>No. of Stages</td>
<td>2</td>
</tr>
<tr>
<td>Engine Types</td>
<td>Cryogenic bi-liquid</td>
</tr>
<tr>
<td>Propellants</td>
<td>LOX/bioLPG</td>
</tr>
<tr>
<td>No. of Engines</td>
<td>6</td>
</tr>
<tr>
<td>Power Cycle</td>
<td>Pump</td>
</tr>
<tr>
<td>Attitude Control</td>
<td>TVC</td>
</tr>
</tbody>
</table>
Launch vehicle - innovation

• Modern low mass architecture
• 100% renewable ultra low carbon fuel
• Zero shock / zero debris separation
• Low mass recovery and re-flight system
• Smart redundant ignition system
• Scalable propulsion power density
• Class-leading 1300mm diameter
• Space tolerant, lightweight avionics
Launch vehicle progress - propulsion

World’s 1st ignition of sub-cooled LPG/LOX propulsion system
Launch vehicle progress - structures

Patent pending architecture that reduces launch vehicle mass by 30%
Launch vehicle progress - avionics

Space tolerant, lightweight, low cost flight computing platform
Production, integration & launch supply chain

DK / engine test facility

UK / Sutherland launch site

UK / LV R&D facility 2000m²

DK / engine R&D facility 2000m²

PT / Malbusca launch site

PT / Deimos GNC + GS

ES / Deimos GNC + GS
Logistics & local operations support

UK / LV integration

UK / Containerized LV

PT / Malbusca launch site

PT / Local operational team
PT / LV stocks held locally
PT / Self-sufficient launch system
PT / LOCC
Azores Open Lean Spaceport

- Orbex + Deimos UK insight offers faster / more efficient Azores spaceport
- Concept aims at maximising existing infrastructure
- Only limited infrastructure improvement needed for Prime
Malbusca site on Santa Maria

Deimos + Orbex team members studying the Malbusca site
Safety and environment: Prime is a perfect fit

Feasibility limit: ~1.3km

Worst theory case

Worst credible case
Azores Launch Site Concept (1 pad)
Azores Launch Site Concept (2 pads)
Next steps: AISLP consortium

- Large consortium of capabilities and synergies
- 3 founding members plus 17 other key partners
- Highly supportive of AISLP objectives
- Strong support for Azores Open Lean Spaceport concept
Conclusion

- Good fit to site constraints
- Highly innovative
- Strong technical progress
- Environmentally responsible
- Early Portuguese involvement
- Advanced operational concept
- Clear technology roadmap