The Shape of Power in Space

**Ultra**
- Lightweight: 1/3 total mass* (150 W/kg BOL)
- High strength: Designs with strength >5 g’s, flight proven*
- High Deployed Stiffness: 3-8x higher 1st mode*, designs with 3-5 Hz available
- Compact: 1/4 stowage volume and footprint* (40 kW/m³)
- Reliable: flight proven; deployment powered by a single (electrically redundant) motor

**Flexible**
- Interchangeable with rigid array technology
- Scalable: ~Ø1.7 m (0.5 kW) to Ø10 m (20 kW) and beyond
- Customizable: may be optimized for $/W, W/kg, deployed frequency, etc.
- Maneuverable: option to withstand >5 g’s deployed (e.g. for landing, docking, or transfer orbit power)
- All photovoltaic technologies accommodated including with concentrators

**Motor Driven Deployment / Staging Options:**
- “Standard” wing staging (e.g. Phoenix, CRS, InSight)
- Options with hinged standoff boom (e.g. Orion CEV)

* compared with rigid panel solar array of same power
Two Decades of Development and Flight Heritage

<table>
<thead>
<tr>
<th>Program</th>
<th>Date Year(s)</th>
<th>Hardware Built</th>
<th>Wing Diameter (m)</th>
<th>Cell Technology (efficiency)</th>
<th>Maturity Achieved</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualification UltraFlex Solar Array Wing</td>
<td>'94-'95</td>
<td>Qual Wing (1 active gore)</td>
<td>3.1</td>
<td>BSFR Silicon (13.7%)</td>
<td>Successfully completed full wing level qualification tests</td>
<td>Qual-wing system (with one active gore) successfully qualified - survived all thermal, vibration, and vacuum environments. Successful coupon testing: 1850 cycles -150C to 100C.</td>
</tr>
<tr>
<td>Mars 01 - Lander</td>
<td>'98</td>
<td>2 Flight Wings</td>
<td>2.1</td>
<td>High Efficiency Silicon (17%)</td>
<td>Flight hardware built, qualified, and delivered</td>
<td>Robust design deploys without offloading in 1g. Program cancelled due to NASA budget constraints. Successful coupon testing 300 cycles -140C to 80C.</td>
</tr>
<tr>
<td>Mars Phoenix Lander</td>
<td>04-07*</td>
<td>2 Flight Wings</td>
<td>2.1</td>
<td>TJ (24%)</td>
<td>100% Flight success</td>
<td>Robust design deploys without offloading in 1g environment and provides &gt;103 watts/kg specific power</td>
</tr>
<tr>
<td>NASA - New Millenium STB</td>
<td>04-09*</td>
<td>Full-scale EDU</td>
<td>5.5</td>
<td>Mesa Simulators</td>
<td>Completed CDR; TRL 6 achieved. Mission Cancelled</td>
<td>Scale-up hardware and modeling capability validated by extensive hardware build &amp; test program</td>
</tr>
<tr>
<td>NASA CEV - Orion (now MPCV)</td>
<td>08-11*</td>
<td>Many validation coupons</td>
<td>6</td>
<td>TJ (28%)</td>
<td>PDR 8/2009 (on hiatus)</td>
<td>UF Technology selected for flagship manned NASA mission 2.7g's on-orbit strength. Coupon qualifications.</td>
</tr>
<tr>
<td>Orbital ATK CRS Cygnus</td>
<td>11-'14</td>
<td>10 Flight wings</td>
<td>3.7</td>
<td>ZJ/Luna (29%)</td>
<td>Flown 3 Missions</td>
<td>UF selected for ISS &quot;COTS&quot; resupply cargo mission. ~5 g's deployed strength to withstand Station plume loads.</td>
</tr>
<tr>
<td>Mars Insight</td>
<td>12-'15</td>
<td>Full-scale Flight-like Wing</td>
<td>9.6</td>
<td>Large-area TJ &amp; IMM coupons</td>
<td>TRL 5 demonstration program</td>
<td>Technology Development to enable near-term Solar Electric Propulsion missions of 30-50kW with scalability to 250kW.</td>
</tr>
<tr>
<td>LUCY</td>
<td>16-21*</td>
<td>2 Flight Wings</td>
<td>6.1</td>
<td>ZJ/Luna (29%)</td>
<td>Program Started</td>
<td>Scale-up of CRU/Cygnus design, engineered for 5.1AU deep space environment.</td>
</tr>
</tbody>
</table>

Qualified for all Space Environments:

Deep Space (Solar Electric Propulsion)

**MegaFlex**

**350kW Spacecraft in EELV**

MegaFlex incorporates a folding panel for twice the power on a given launch vehicle.

More Information

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