Commercial Crew & Cargo Program and COTS Status

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Title: Manager, Commercial Crew & Cargo Program
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The Commercial Crew & Cargo Program Office was established at the Johnson Space Center in 2005 to accomplish the following objectives:

- *Implement U.S. Space Exploration policy with investments to stimulate the commercial space industry*

- *Facilitate U.S. private industry demonstration of cargo and crew space transportation capabilities with the goal of achieving safe, reliable, cost effective access to low-Earth orbit*

- *Create a market environment in which commercial space transportation services are available to Government and private sector customers*
Commercial Orbital Transportation Services (COTS)

• **COTS Project**
  – $500M investment for demonstration of commercial orbital transportation capabilities
  – Paves the way for NASA to offer the ISS as a new market for U.S. commercial providers

• **SpaceX and Rocketplane Kistler (RpK) awarded funded Space Act Agreements in August 2006**
  – SpaceX has completed all milestones to date
  – RpK was unsuccessful in completing technical and financial milestones and was terminated in October 2007

• **Second round competition for $170 million remaining balance of available funding completed February 19, 2008**

• **Orbital Sciences Corp. was selected as the new funded SAA COTS partner**
Orbital COTS Project Summary

Description & Features:

• **Taurus II Launch Vehicle** -- 6 MT to ISS orbit
  - 1\(^{\text{st}}\) Stage: Lox/RP Aerojet AJ-26 engines (2)
  - 2\(^{\text{nd}}\) Stage: Castor 30

• **Standard Service Module** used for all missions
  - Derived from STAR & Dawn spacecraft

• **Pressurized Cargo Module**
  - Derived from ISS MPLM

• **Unpressurized Cargo Module**
  - Derived from ISS ExPRESS Logistics Carrier
## Orbital SAA Performance Milestones

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Date</th>
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<tbody>
<tr>
<td></td>
<td><strong>FY08</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Project Plan Review</td>
<td>Mar 08</td>
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<tr>
<td>2</td>
<td>Demo Mission SRR</td>
<td>Jun 08</td>
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<tr>
<td>3</td>
<td>Unpressurized Cargo Module PDR</td>
<td>Jul 08</td>
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<td>4</td>
<td>Demo Mission PDR</td>
<td>Sep 08</td>
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<td><strong>FY09</strong></td>
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<tr>
<td>5</td>
<td>COTS Integration/Operations Facility Started</td>
<td>Oct 08</td>
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<tr>
<td>6</td>
<td>Pressurized Cargo Module PDR</td>
<td>Nov 08</td>
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<tr>
<td>7</td>
<td>Unpressurized Cargo Module CDR</td>
<td>Nov 08</td>
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<tr>
<td>8</td>
<td>IP&amp;CL Delivery</td>
<td>Feb 09</td>
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<tr>
<td>9</td>
<td>Demo Mission CDR</td>
<td>Mar 08</td>
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<tr>
<td>10</td>
<td>COTS Visiting Vehicle Avionics Test</td>
<td>Jun 09</td>
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<tr>
<td>11</td>
<td>Unpressurized Cargo Module Fab Started</td>
<td>Jul 09</td>
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<td><strong>FY09</strong></td>
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<tr>
<td>12</td>
<td>Service Module Core Assembly Started</td>
<td>Oct 09</td>
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<tr>
<td>13</td>
<td>Service Module TRR</td>
<td>Jan 10</td>
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<tr>
<td>14</td>
<td>Service Module Initial Performance Test Complete</td>
<td>May 10</td>
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<tr>
<td>15</td>
<td>Launch Vehicle Stage 1 Assembly Complete</td>
<td>Sep 10</td>
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<tr>
<td></td>
<td><strong>FY10</strong></td>
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<tr>
<td>16</td>
<td>Mission Readiness Review</td>
<td>Oct 10</td>
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<tr>
<td>17</td>
<td>Demo Flight</td>
<td>Dec 10</td>
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SpaceX Recent Progress

- Completed Falcon 9 1\textsuperscript{st} stage tank qualification
- Completed first multi-engine test
- Continued launch site preparations at CCAFS
  - Demolition of tower at LC-40

SpaceX Falcon 9 First Stage Two Engine Test, Jan 18, 2008 Video

SpaceX SLC 40 Tower Demolition
SpaceX Milestone Highlights

- **FY06**
  - Program Management Plan/Kickoff  ✓ *Completed*

- **FY07**
  - System Requirements Reviews  ✓ *Completed*
  - Preliminary Design Review  ✓ *Completed*
  - Financing Round  ✓ *Completed*
  - Critical Design Review  ✓ *Completed*

- **FY08**
  - Δ System Requirements Review  ✓ *Completed*
  - Δ Preliminary Design Review  ✓ *Completed*
  - Demo 1 Readiness Review
  - Financing Round
  - Δ Design Reviews
  - Orbital Test Flight 1

- **FY09**
  - Demo 2/3 Readiness Reviews
  - Orbital Test Flight 2
  - Orbital Demonstration Mission to ISS
COTS Flight Demonstration Schedule

- Cargo Demo Flight 1 (Sep) 2008
- Cargo Demo Flight 2 (Jun) 2009
- Cargo Demo Flight 3 to ISS (Sep) 2010
- Crew Demo Flight 1 (Jun) 2011
- Crew Demo Flight 2 (Dec) 2012
- Crew Demo Flight 3 (Apr) 2012

Funded Milestone
Optional Milestone
Other Commercial Partners

• NASA continues to support our unfunded SAA commercial partners
  – Constellation Services International
  – PlanetSpace
  – SpaceDev
  – SPACEHAB
  – t/Space
A New Era In Spaceflight Is Beginning...

COMMERCIAL CREW & CARGO