



Last Updated October 31, 2014

## VIRGIN GALACTIC SPACE VEHICLES FACT SHEET

**NOTE: THIS INFORMATION WAS PRODUCED AND ACCURATE IN ADVANCE OF TRAGIC EVENTS ON OCTOBER, 31 2014. IT HAS BEEN PROVIDED TO SUPPORT SUBSEQUENT MEDIA ENQUIRIES**

[Virgin Galactic](#), the world's first commercial spaceline, owns and operates a space system consisting of two vehicles, SpaceShipTwo and WhiteKnightTwo:

### SPACESHIPTWO (SS2): SS2 IS VIRGIN GALACTIC'S REUSABLE SPACEPLANE

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#### **About the Vehicle**

- Uses much of the same technology, construction and design of [SpaceShipOne](#), but is twice the size and designed for commercial service rather than a proof of concept demonstration.
- Designed for two pilots and as many as six passengers (or an equivalent amount of research payloads)
- Designed and built by [Scaled Composites](#); future SS2 vehicles will be manufactured by Virgin Galactic's [The Spaceship Company \(TSC\)](#)
- Second SpaceShipTwo ("SS2-02"), built by TSC, is approximately 60% complete as of October 2014.

#### **Technical Specifications**

- Dimensions
  - Wing span: 42 feet
  - Length: 60 feet
  - Tail height: 18 feet (feather down)
- Cabin details: 90-inch diameter x 12 feet long
  - Cabin approximately the size of a Falcon 900 executive jet
  - Whole fuselage used for passenger cabin
  - Large windows positioned throughout the cabin to afford maximum viewing potential for passengers
  - Planning for reclining seats to maximize cabin space in zero-g and for re-entry comfort
  - Feathering wings for re-entry: same technology as SS1; improved aerodynamics
- Construction: All structural components are 100 percent carbon composite
- Propulsion: hybrid rocket motor uses benign fuel and oxidizer and is controllable – can be shut down at any time during boost phase of flight
  - After release from carrier aircraft, rocket motor is engaged for ascent to space; re-entry and landing are without propulsion
- Gear: tricycle gear configuration; 2x wheeled main gear; 1x nose skid, with abrading shoe, like SS1

#### **Flight Profile**

- Total independent flight time around 30 minutes; flight time including captive carry by WhiteKnightTwo around two hours
- G-Forces: Max gx (front to back): 6g; Max gz (head to toe): 3.5g
- Planned apogee of spaceflight: to exceed NASA's definition of space
- Zero-g phase – several minutes of out-of-seat time
- Velocity: supersonic within eight seconds of rocket ignition with a maximum velocity of approximately Mach 3.5

#### **Key Facts**

- Total Number of Flights: 55 (30 glide flights; 2 cold flow flight; 18 captive carry flights; 3 rocket-powered supersonic flights; all as of October 30, 2014)
- Milestone dates:
  - Unveiled on December 7, 2009

- First “captive carry” test flight: March 22, 2010
- First drop test and solo flight: October 10, 2010
- First feathered flight: May 4, 2011
- Cleared full glide-flight envelope for airspeed, angle-of-attack, center of gravity and structural loads: August 11, 2012
- First in-flight nitrous vent test: April 3, 2013
- In-flight cold flow test (mission rehearsal for first powered flight): April 12, 2013
- First rocket-powered, supersonic flight: April 29, 2013
- Second rocket-powered, supersonic flight: September 5, 2013
- Third rocket-powered, supersonic flight: January 10, 2014
- Second In-flight cold flow test: August 28, 201

## WHITEKNIGHTTWO (WK2): CARRIER AIRCRAFT FOR SPACESHIPTWO

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### **About the Vehicle**

- Largest carbon composite carrier craft in service (all structural components are 100 percent carbon composite)
- Designed and built by [Scaled Composites](#); future WK2 vehicles are being manufactured by Virgin Galactic’s [The Spaceship Company \(TSC\)](#)
- Training vehicle for SS2 spaceflight
  - Can simulate SS2 g-force profile
  - Both fuselages replicate that of SS2 and right-hand cabin interior is identical, potentially allowing for future passenger training
  - Can fly simulated SS2 descent and landing approach profiles for pilot training
  - Unique high-altitude lift aircraft potentially suitable for various payloads

### **Technical Specifications**

- Dimensions:
  - Wing span: 140 feet (only 16 feet less than Boeing 767-300)
  - Length: 78 feet
  - Tail height: 25 feet
- Construction: Twin boom/fuselage construction
- Powerplant: uses highly efficient turbo fan jet engines
- Gear: Quadricycle gear configuration, retractable
- Performance: SS2 ferry range; U.S. coast to coast

### **Flight Profile**

- For nominal SS2 release:
  - Total flight time: approximately two hours
  - From takeoff to SS2 release: approximately 60 minutes
  - SS2 release: approximately 50,000 feet

### **Key Facts**

- Total Number of Flights: 172 flights (as of October 30, 2014)
- Milestones:
  - First flight: Dec. 21, 2008
  - Test flight program substantially complete including high-altitude and long-duration

## **ENVIRONMENTAL IMPACT**

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- Air launch minimizes the amount of rocket exhaust when compared to ground launch
- Carbon composite construction a quarter the weight of steel for the equivalent strength- transforms the energy requirements for both launch aircraft and spaceship
- Hybrid rocket motor – benign, non-toxic fuels with a high altitude and short burn time due to air launch
- Unpowered descent and landing
- Fully reusable

## **LICENSING**

- U.S. regulatory framework established by 2004 Commercial Space Launch Amendments Act, which empowered the Office of Commercial Space Transportation within the Federal Aviation Administration to regulate and license commercial space launch vehicles and operators.
- Enshrined the principle of Informed Consent for space flight participants, permitting a licensed operator to carry passengers on space flights, once the passengers are informed of and accept a comprehensive explanation of the potential risks involved.

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