

Preface

“Today’s flight was another resounding success. We focused on gathering more transonic and supersonic data, and our chief pilot, Dave, handled the vehicle beautifully. With each flight test, we are progressively closer to our target of starting commercial service in 2014.”

Virgin Galactic CEO, George Whitesides

As the main engine ignites, the crew feels a deep rumble behind them and a sudden sensation of motion as the rocket ignites, trailing a 100-meter-long fountain of exhaust in an inferno of smoke, searing light, and earth-shaking noise. Amid the thunder of launch, the numbing noise, and the incredible acceleration, the crew is pushed forcefully back into their seats. The gut-wrenching journey to suborbital space – an event planned for many weeks and anticipated by the crew for several months – takes less than five minutes. Once in microgravity, the thrill of the ascent is replaced by the immediacy of the moment, as the spaceflight participants – now fully fledged Virgin Galactic astronauts – pull out cameras and float to the nearest window to take snapshots from the vantage point in space.

About

We are Virgin Galactic, the world’s first commercial space-line. We are working hard to make access to space orders of magnitude more affordable, frequent, and safe than ever before. We are also having a lot of fun while doing so.

Mission

Make access to space orders of magnitude more affordable, frequent, and safe than ever before.

Description

Virgin Galactic, owned by Sir Richard Branson’s Virgin Group and Aabar Investments PJS, is on track to be the world’s first commercial spaceline. Our reusable, suborbital spaceship (SpaceshipTwo) and carrier craft (WhiteKnight-Two) have both been

developed by the legendary aerospace pioneers Scaled Composites. Founded by Burt Rutan, Scaled developed SpaceShipOne, which in 2004 claimed the \$10m Ansari X-PRIZE as the world's first privately developed manned spacecraft.

Our new vehicles share much of the same basic design, but are being built to carry six customers and two pilots on sub-orbital space flights. Each mission will give our future astronauts an out-of-the-seat, zero-gravity experience offering astounding views of the planet from the black sky of space.

The test flight programs for SpaceShipTwo and WhiteKnightTwo are well under way, leading to Virgin Galactic commercial operations, which will be based at Spaceport America in New Mexico.

In July 2012, we announced a new program called LauncherOne. LauncherOne will be launch small satellites into orbit for a wide variety of commercial and government customers.

www.virgingalactic.com

Welcome to Virgin Galactic's world of suborbital spaceflight

The above snapshot is taken from the Virgin Galactic website. Until recently, space-flight had been the providence of a select corps of professional astronauts whose missions, in common with all remarkable exploits, were experienced vicariously by the rest of the world via television reports and internet feeds. These spacefarers risked their lives in the name of science, exploration, and adventure, thanks to government-funded manned space-flight programs. All that is about to change thanks to Virgin Galactic, despite the tragic event on 31 October 2014, when VSS *Enterprise*, a Virgin Galactic test vehicle, suffered a catastrophic breakup and crashed in the Mojave Desert.

As George stated above, each SpaceShipTwo test flight is one step closer to Virgin Galactic's plans to launch daily flights into space. And when those first passenger flights begin, it will be the beginning of a new era in space travel. Passenger space travel has been a staple of sci-fi for almost as long as there have been commercial airlines. As far back as 1968, when Stanley Kubrick's *2001: A Space Odyssey* was released, Pan Am opened a waiting list for trips to the Moon. Part publicity stunt, the airline (it went bankrupt in 1991) estimated the service would begin no later than 2000. They even issued numbered membership cards for the first lunar flights! Inspired by the Moon landing the following year, 98,000 people signed up.

Nearly 50 years later, the bar is set a little lower. When testing is complete, SpaceShipTwo will fly to suborbital altitudes where passengers will enjoy four minutes of weightlessness. Slung beneath the WhiteKnightTwo mothership, SpaceShipTwo's ascent to the 15-kilometer launch altitude takes more than an hour. For passengers, who have paid US\$250,000 for the ride, there is nothing to do but wait for the moment of release. No drinks service on this ride. Once released, the diminutive spaceship drops away, the pilot ignites the rocket motor, and with a roar the spacecraft shudders to full thrust within a tenth of a second, its nose pointed straight up to the edge of space. Even if you've ridden the "fuge", as every passenger has, the acceleration is almost impossible to imagine, as 3 Gs pins them to the back of their seats. Twelve seconds later, the vehicle rockets through Mach 1. Mach 2 follows shortly after. Within 60 seconds, the vehicle is traveling at 4,800 kilometers per hour. Amid the diabolical noise (ear plugs are mandatory), the

vibration, and acceleration, the soon-to-be astronauts try to keep their composure as they watch the sky turn from blue to navy, indigo, and then – suddenly – black.

At around 80 seconds, the pilot cuts the engine and, shortly after, the spaceship enters zero gravity. The passengers are now Virgin Galactic astronauts. Releasing their seat belts, they float around the cabin, and gaze at the view: 1,600 kilometers from horizon to horizon, the curvature of Earth subtle but clear, the fine blue line of the atmosphere easily visible against the blackness of space. On-board cameras capture every second of the experience. At the top of its parabolic arc, the rocket plane spends just four minutes in space before it begins its fall back down to Earth. The pilot positions the “feather” for re-entry, and the passenger seats recline to enable the newly minted astronauts to cope with up to 6 Gs of acceleration during their ride back to the desert runway.

If everything goes to plan, Branson hopes not only to give birth to a new industry, but to democratize the government-dominated spaceflight business by opening the space frontier to commercial astronauts, payload specialists, scientists, and, of course, tourists. But, as the tragic event of 31 October 2014 reminded us, the aerospace business is rarely one in which things go to plan. After the accident in which pilot Michael Alsbury was killed, Sir Richard Branson vowed that his Virgin Galactic space programme, saying millions of people “would one day love the chance to go to space”. This book tells the story to date.

Virgin Galactic

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