

Spaceport America

RUNWAY CONSTRUCTION MAKES PROGRESS AT SPACEPORT AMERICA

UPHAM, NM “ The construction of a new runway is well underway at Spaceport America, the world’s first purpose-built commercial spaceport. New Mexico Spaceport Authority (NMSA) officials have released new aerial photos taken on September 13, 2009, of the 10,000-foot runway project, which is designed

The Terminal Hangar Facility at Spaceport America is projected to be complete by early 2011. The NMSA has been working closely with leading aerospace firms such as Virgin Galactic, Lockheed Martin, Moog-FTS, UP Aerospace and Microgravity Enterprises to develop commercial spaceflight at the new facility.

MOTHERSHIP “EVE” ROLL OUT



to accommodate horizontal launch space and air operations at the spaceport. The runway is expected to be complete by late Summer 2010. Measuring 10,000 feet long by 200 feet wide, the runway is designed for day-to-day space tourism and payload launch operations like those anticipated for Virgin Galactic, the anchor tenant for Spaceport America. The large concrete runway will also be able to accommodate returning launch vehicles, fly-back rocket boosters and other space launch and training vehicles.

David Montoya Construction, Inc., of Alameda, NM, is building the airfield at Spaceport America. After successfully completed an RFP process, this contractor was selected to provide construction services of the airfield by the NMSA Board of Directors. David Montoya Construction, Inc., has provided construction services on many large-scale projects since being established in 1985. The company has provided similar concrete paving services for Albuquerque International Airport and Holloman Air Force Base in Alamogordo. David Montoya Construction, Inc., is recognized by the Hispanic Business Magazine as one of the top 500 Hispanic-owned businesses in the United States.

Virgin Founder, Sir Richard Branson and SpaceShipOne designer, Burt Rutan, today pulled back the hangar doors on the new WhiteKnightTwo (WK2) carrier aircraft that will ferry SpaceShipTwo and thousands of private astronauts, science packages and payload on the first stage of the Virgin Galactic sub-orbital space experience.

The rollout represents another major milestone in Virgin Galactic’s quest to launch the world’s first private, environmentally benign, space access system for people, payload and science.

Christened “EVE” in honor of Sir Richard’s mother, who performed the official naming ceremony, WK2 is both visually remarkable and represents ground-breaking aerospace technology. It is the world’s largest all carbon composite aircraft and many of its component parts have been built using composite materials for the very first time. At 140 ft, the wing span is the longest single carbon composite aviation component ever manufactured.

Driven by a demanding performance specification set by Virgin Galactic, WK2 has a unique heavy lift, high altitude capabil-

ity and an open architecture driven design which provides for maximum versatility in the weight, mass and volume of its payload potential. It has the power, strength and maneuverability to provide for pre space-flight, positive G force and zero G astronaut training as well as a lift capability which is over 30% greater than that represented by a fully crewed SpaceShipTwo. The vehicle has a maximum altitude over 50,000 ft and its U.S. coast-to-coast range will allow the spaceship to be ferried on long duration flights.

An all carbon composite vehicle of this size represents a giant leap for a material technology that has already been identified as a key contributor to the increasingly urgent requirement by the commercial aviation sector for dramatically more fuel efficient aircraft. Powered by four Pratt and Whitney PW308A engines, which are amongst the most powerful, economic and efficient available, WK2 is a mold breaker in carbon efficiency and the epitome of 21st century aerospace design and technology.

be comprehensive even before SpaceShipTwo is carried as a payload for the first time in 2009.

SUCCESSFUL SPACESHIP TWO ROCKET MOTOR TESTING

Virgin Galactic today announces the successful completion of the first phase of tests of the rocket motor that will propel space tourists, scientists and payloads into space.

In the desert of southern California, Virgin Galactic's key supplier Scaled Composites and its subcontractor SNC (Sierra Nevada Corporation) have successfully completed the first tests of the innovative rocket motor that will propel space tourists, scientists and payloads into space. The hybrid Nitrous Oxide system being used is the largest of its kind in the world and it will send Virgin's customers up into sub-orbital space at speeds over 2500 mph (4000kmh), to heights over 65 miles (110km) above the Earth's surface, before the spaceship descends back



The twin fuselage and central payload area configuration allow for easy access to WK2 and to the spaceship for passengers and crew; the design also aids operational efficiencies and turnaround times. WK2 will be able to support up to four daily space flights, is able to carry out both day and night time operations and is equipped with a package of highly advanced avionics.

Large numbers of VIP's, media and more than 100 fully signed-up future Virgin Galactic astronauts flew into Mojave for the rollout onboard a new Airbus A320 aircraft specially chartered from Virgin America, the youngest and most efficient US domestic airline, which launched to great acclaim in 2007.

Rutan's Scaled Composites facility has been strictly out of bounds whilst design and construction has been underway, but guests today were additionally given a tantalizing preview of SpaceShipTwo, clearly visible but heavily shrouded and well on its way to completion, in the smaller of Scaled's two hangars awaiting its own rollout in 2009. This will be scheduled once WK2 is at the appropriate stage in its extensive test program, which has already begun with ground tests; it is expected to take its first flight in the fall of 2008. The flight test program will

down through the atmosphere using its pioneering feathered re-entry system.

Sir Richard Branson, founder of Virgin Galactic said: "As Virgin Galactic gets ever closer to the start of commercial operations, we are reaching and passing many important and historic milestones. The Virgin MotherShip (VMS) Eve, the first of our amazing, all carbon composite, high altitude WhiteKnightTwo launch vehicles, is flying superbly. SpaceShipTwo, which will air launch from Eve, is largely constructed and awaiting the start of its own test flight programme later this year."

The rocket motor burns for a very short period of time because the spaceship is launched from VMS Eve in the upper atmosphere, rather than from ground level. This means much less fuel is required, and the fuel burn is more environmentally benign than the solid rockets used in most ground based systems.

While the rocket motor is extremely powerful, it is also completely controllable. This system can - if necessary - be shut down at any time, allowing the spaceship to glide back down to land at a conventional runway. This is a significant feature in the

overall safety of the Virgin system for human space flight.

Sir Richard continues: "Less fuel and clean fuel all add up to a space launch system which will be completely unprecedented in its low environmental impact compared with current space flight. The spaceship's carbon footprint for each of its passengers and crew will be about a quarter of that for a return trip from London to New York, demonstrating again the extraordinary benefits that new technology can bring to the quest for clean transportation." "We believe space is on the cusp of a new industrial revolution. Virgin Galactic's mission has always been to transform the safety, cost and environmental impact of access to space. Not just for passengers, but also for a range of important scientific purposes, and to send small satellites into orbit. The world's scientific community is united in recognising that making better use of space will be vital to mankind's ability to manage the huge future challenges of life back here on Earth."

The rocket motor will continue a series of exhaustive tests, and

mothership and ignites its hybrid rocket. The spaceship then begins a climb from 50,000 feet to over 360,000 feet. This climb takes about 90 seconds and will reach a speed of just over 3 times the speed of sound. Shortly before the apogee (maximum altitude) of its flight path, the spaceship feathers (folds its wings) in preparation for re-entry into the earth's atmosphere, drawn by the Earth's gravitational pull. As the spaceship meets the resistance of the upper atmosphere, the feathered wings act as air brakes, safely positioning and decelerating the spaceship allowing for a carefree re-entry into the earth's atmosphere. At approximately 60,000 feet, the spaceship's wings are re-configured into their original position allowing for an unpowered (glide) landing back at the spaceport.

What is feathering?

In the past, re-entry into the earth's atmosphere was one of the greatest risks associated with space travel. However, Burt Rutan's ingenious feathering design has significantly reduced this risk. In space, the wings are folded up to provide a shuttle-cock or "feather" effect giving the space-



the spaceship itself will start flight testing later this year. The testing programme for the rocket, the spaceship and VMS Eve will be extensive.

VIRGIN GALACTIC

FAQ

How frequent will the flights be?

Initially, there will be one flight per week. As operations progress, this will increase to one and potentially two flights per day.

How many passengers and pilots will there be on each flight?

SpaceShipTwo will carry 6 astronaut passengers and two pilots.

What does the space flight consist of?

The spaceship hitches a ride up to around 50,000 feet attached to a specially designed carrier aircraft, 'the mothership'. Once at 50,000 feet, the spaceship is released from the

ship extremely high drag for reentry. This allows the reentry deceleration to occur at a higher altitude and greatly reduces the forces and heating on the structure. Also, the ship, in the feathered configuration, will align itself automatically such that the pilot has a less-critical flight control task. Burt Rutan describes this as "care-free reentry". Once in contact with the atmosphere, the feathered wings position the vehicle to the correct altitude without pilot input.

What is the difference between a Virgin Galactic spaceship and a NASA shuttle?

A lot! To be fair, the Space Shuttle was designed to carry significant payloads and people into orbit rather than people only into sub-orbit. However there are some key design differences which represent important developments in the future of safe and commercially viable space travel. Firstly, SpaceShipTwo is being built from composite materials not metal, creating major benefits in weight, power output requirements and resilience. Secondly, the feathering mechanism (described above) means that these spacecraft do not require specially designed (and historically unreliable) thermal protection systems used by the Space Shuttle. Thirdly, SpaceShipTwo will be air launched not ground launched. This has important benefits

for both safety and environmental impact. SpaceShipTwo is being built following a design brief that deliberately seeks to avoid unnecessary complexity and in particular, moving parts. This is a very different concept than that which applied to the Space Shuttle and one which is key to safety and reliability. SpaceShipTwo's rocket propellant system will be a single hybrid rocket motor rather than the separate solid and liquid rocket boosters/engines used by the Space Shuttle. There are great

Where will the space flights be launched from?

Virgin Galactic's spaceport and operational head quarters, Spaceport America, will be built in New Mexico. However, initial flights will be launched from the Mojave Spaceport in the Mojave Desert, California.

Who is designing and building the spaceships?

The Spaceship Company, a joint venture between Sir Richard Branson's Virgin Group and Burt Rutan's Scaled Composites, has contracted Scaled Composites to design and build SpaceShipTwo and the mothership WhiteKnightTwo. Virgin Galactic will own and operate at least five of the new spaceships and two motherships.



safety advantages to the hybrid system which of course needs to develop far less power than the Space Shuttle due to weight and scope of flight.

Where are the spaceships being built?

The spaceships are being built by Burt Rutan's Scaled Composites which is based at the Mojave Spaceport in California, USA.

SPACE SHIP 2

