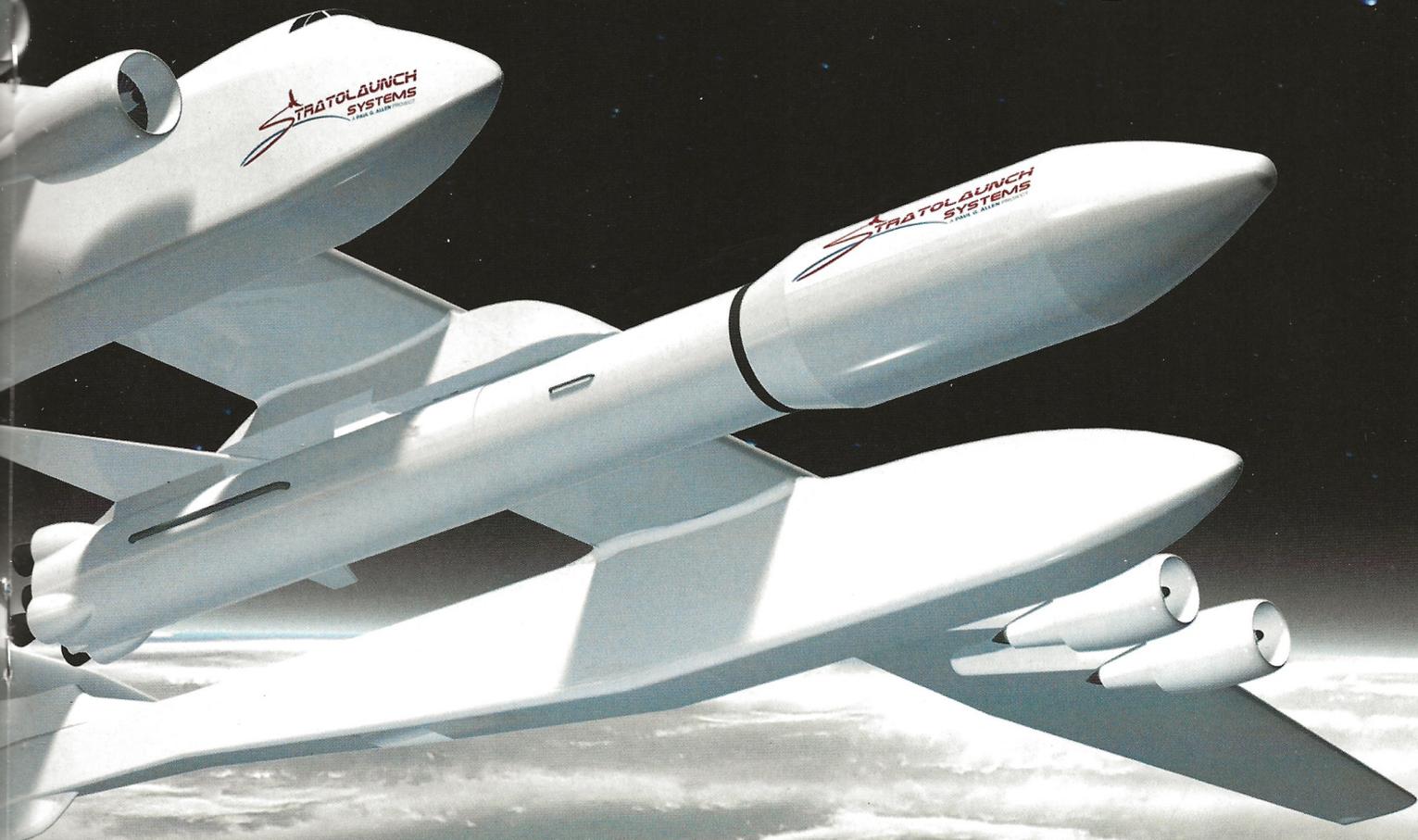


# Space trucking

Stratolaunch Systems puts Huntsville on the commercial flight map



By Kimberly Ballard

**T**he recent announcement that commercial space firm Stratolaunch Systems would headquarter in Huntsville caps a decision both revolutionary and evolutionary in nature – as revolutionary and evolutionary as the company's commercial space venture. Launched in 2011 by Microsoft cofounder Paul Allen and commercial spacecraft design legend Burt Rutan, Stratolaunch Systems has set its sights on the next generation of manned spaceflight and a bold approach to it. The company intends to develop and produce the largest aircraft ever built, a craft capable of orbital missions that is reusable, safe and economical. Immediate customers could include the International Space Station, now completely dependent on Russia's big dumb boosters for resupply until a new-wave cargo delivery vehicle flies. Space tourists are among future customers, to be sent up for three-day orbits.

While these are grand plans on an immense scale, Stratolaunch Systems is as low-key as a mission control technician. Everything's nominal. "Like a calm pond. That's how Paul Allen operates," says Paul Ghaffari, chief investment officer at Vulcan Inc., the Microsoft cofounder's umbrella investment group. "We find it best to under-promise and over-deliver. Underneath the surface though, there is a lot going on."

"That's Paul Allen," says Dave King, executive vice president of integrated systems and special programs at Dynetics. "He has the money to do what he wants and he surrounds himself with people he trusts to get it done, no matter how complex the job. He has always said this is not about return on investment to him. It is his passion and his legacy."

The Stratolaunch Systems decision could have tremendous impact for the Rocket City, which has seen its aerospace industry slowed in recent years by what appears to be a lack of enthusiasm nationwide for NASA's space program and the recent death of the much-vaunted Constellation program. After riding a wave of achievement generated by Dr. Wernher von Braun and a pre-eminent NASA, Huntsville has in subsequent years shifted from space into military weaponry. But the Stratolaunch Systems headquarters move should place Hunts-

ville on the cutting edge of the newest frontier in space: commercial flight.

"Huntsville is uniquely qualified to take on the challenges of a commercial space venture, especially one backed by someone like Paul Allen," says Ethan Hadley, vice president of economic development for the Huntsville-Madison County Chamber of Commerce. "The space industry is a small universe and Huntsville has been at the center of it from the beginning. From an economic development standpoint, Stratolaunch is a rock-solid addition to our community."

As it turns out, there's one key ingredient to success in space that the Rocket City has not lost after 60 years: expertise. "This is a great opportunity for Huntsville to show our expertise in engineering and design," says Huntsville Mayor Tommy Battle. "Much as Huntsville engineers helped design the Dreamliner for Boeing, our Huntsville professionals will be designing one of the world's latest airplanes. Just as Huntsville made history by providing the propulsion system that took man to the moon, this effort is another chapter in Huntsville's history."

## GATHERING FORCES

But this is a story that didn't just happen all at once. There has been a lot going on for quite some time. The people who are now Stratolaunch Systems' major players set their courses as early as 1996 when Gary Wentz, the company's new president and CEO, first came to Huntsville on a temporary assignment with NASA to work on the space station. In 2001, Wentz transferred to Marshall Space Flight Center, where as chief engineer of science and mission systems, he often crossed paths with then-MSFC Director King.

There were other Huntsville undercurrents, as well. In 2002 Huntsville's own creative propulsion mastermind, Tim Pickens, swam with some very big fish when as lead propulsion engineer for Rutan's Scale Composites, he designed a rocket propulsion system that was "as simple as possible, but no simpler" for SpaceShip One, Rutan's ingenious shuttlecock design.

Meanwhile in California, South African engineer and entrepreneur Elon Musk rode a new wave of aerospace enthusiasm when he founded Space Ex-

ploration Technologies (SpaceX) in Hawthorne, Calif., a suburb of Los Angeles. According to Kirstin Brost Grantham, SpaceX communications director, Musk had the singular but extravagant goal of making it possible to live on other planets using the most affordable and practical means of getting there. In a 2004 joint venture between Allen and Rutan, SpaceShip One became the first manned spacecraft ever air-launched into suborbital flight using private funding. Standing on the tarmac following the historic landing, a casual conversation ensued between Allen, Rutan and then-NASA Administrator Michael Griffin about how cool it would be if the next step were to involve orbital tourism, rather than just suborbital flights.

That conversation grew wings. It became the system that Stratolaunch Systems proposes, which draws together a giant carrier aircraft Scale Composites began building in January in the Mojave Desert using a design that has been around for several years. Also in January, Stratolaunch Systems announced groundbreaking on a gigantic aircraft hangar in the desert to house the craft. In February, the first two Boeing 747 donor aircraft for the carrier craft were purchased. BAE Systems has developed the plan for how those aircraft will be incorporated into the carrier craft.

The Stratolaunch system also incorporates a multistage booster created by SpaceX. The two are to be joined by a Dynetics-developed mating and integration system that will allow the carrier aircraft to lift and carry the booster, which could weigh as much as 490,000 pounds. In effect, the carrier acts like a launch pad for the rocket and orbiter. The design calls for an aircraft much larger than a Boeing 747, with a wingspan of 385 feet, powered by six 747 jet engines. It would need to carry a multi-stage rocket booster loaded with cargo under its belly, and be capable of flying up to 30,000 feet in order to release and ignite the rocket to propel it into space.

In 2006, SpaceX won a NASA Commercial Orbital Transportations Services (COTS) contract to design a non-manned cargo-carrying launch system that could dock with the International Space Station. By 2008 its Falcon 1 had delivered its first payload into orbit, but by then

## NEWSMAKERS

SpaceX had a new Falcon 9 rocket to carry a ballistic capsule named Dragon, newly commissioned by NASA as the next cargo-delivery system for the station. In the nose of the Dragon capsule are seven "Dragon seats" mounted to strong, lightweight supporting structures attached to the pressure vessel walls. Each seat holds an adult up to 6 feet 5 inches tall weighing 250 pounds, and has a liner that is custom-fitted for either crewmembers or space tourists. At Cape Canaveral, Fla., on Dec. 8, 2010, a Falcon 9 successfully carried an unmanned Dragon on COTS Demo Flight 1.

In 2010, all the system parts had come together. Allen and his team had a rocket launch system, a design for a carrier aircraft and the orbital spacecraft. "The launch vehicle uses a lot of the Falcon 9 systems so we don't have to worry about that," Wentz explains. "The challenge we are facing now is the integration segment. It is completely new."

### HOTBED OF TALENT

In 2010, all the elements had come together. "We had been thinking about it for a long time – two or three years," says Chris Purcell, Vulcan's vice president of technology. "Who could bring the ideas? Where could we find a hotbed of talent? Everyone in the industry knows Huntsville is the Silicon Valley of the South, so Paul Allen made a call to Mike Griffin to see who he could talk to about standing something like this up."

"The way this began for us was a phone call from Mike Griffin, whom I knew well from my time as director at MSFC," says Dynetics' King. "Mike asked me who I could call and how we could go about putting a great team together to make this happen." By now, Griffin had become an eminent scholar and professor at the University of Alabama in Huntsville. A current began to flow between all the players, and it would have a rippling effect.

In the commercial world, King points out, people can build on unique personal relationships much easier than in the government sector, and it was this mechanism that drew Wentz in. "That's how Gary got in-

## A Leader in Aerospace Solutions

Demonstrating technologies necessary to develop future capabilities for Conventional Prompt Global Strike.

Ducommun Miltec led the industry team during the first successful Advanced Hypersonic Weapon (AHW) boost-glide flight test conducted by USASMD/ARSTRAT.



# Ducommun Miltec

Revolutionizing the delivery of defense, aerospace and security solutions for a better future.

Equal Opportunity  
Employer

[www.ducommun.com/miltec](http://www.ducommun.com/miltec)

0000271858-01

## The Avion Advantage.



Avion is an Employee-Owned Small Business highly regarded as a Leader in the U.S. Army Aviation community. Avion has been recognized for delivering a broad range of high quality Specialized Engineering, Software Development, Logistics and Technical Services. Our employees have a passion to support the Soldier. Avion provides rewarding careers for innovative technical professionals that strive for excellence and that share our Mission of Supporting the Warfighter!



[www.avioninc.com](http://www.avioninc.com)  
Avion is an Employee-Owned Small Business

4905 Research Drive NW • Huntsville, AL 35805 • (256) 721-7006 • Fax: (256) 721-7007

000026885-01



Roger Gilbertson / SpaceX

**Dragon crew vehicle.**

Roger Gilbertson / SpaceX

**Test crew from top left: NASA Crew Survival Engineering Team Lead Dustin Gohmert, NASA Astronaut Tony Antonelli, NASA Astronaut Lee Archambault, SpaceX Mission Operations Engineer Laura Crabtree, SpaceX Thermal Engineer Brenda Hernandez, NASA Astronaut Rex Walheim, and NASA Astronaut Tim Kopra.**



Roger Gilbertson / SpaceX

**Seven-crewmember Dragon seats can hold an adult up to 6'5" tall, 250 lbs, and have a liner that custom-fits the member.**



Roger Gilbertson / SpaceX

**NASA Astronaut Rex Walheim, SpaceX CEO and Chief Designer Elon Musk, and SpaceX Commercial Crew Development Manager and former NASA Astronaut Garrett Reisman standing inside the Dragon spacecraft during testing activities.**

volved in this," King says. "I have worked with Gary for 20 years in the industry. Frankly, we are in this thing together. We are in it to succeed and to pull together whatever resources we need to make it a success, and we have that capability with our existing workforce here in Huntsville."

In February 2011, the new company called Stratolaunch Systems was incorporated into the Vulcan Inc. enterprise. In November, Wentz left NASA to join Stratolaunch Systems as its president and CEO, with its headquarters in Huntsville. "Huntsville has two benefits over a lot of other cities," says Wentz. "You have a huge space community and a large aviation community. The Strato-launch project brings those two things together."

### **'COMPLICATED FUNCTIONALITY'**

"We will build the Main Integration System in Huntsville," explains Wentz. "In order to launch a 460,000-pound rocket from 30,000 feet, the integration between the aircraft and the rocket is entirely different from your typical launch from the ground with the rocket and capsule pointed straight up. This requires very complicated functionality. We drop the rocket, make sure it is pointing in the right direction when we light it, and so much more. We are working with Scale Composites and SpaceX to determine exactly how all that is going to look."

For starters, Stratolaunch Systems will be integrating all the smart parts

**The Dynetics building in Cummings Research Park.**



## NEWSMAKERS

from the retired 400 series of 747 commercial jetliners like the landing gear, avionics, cockpit gear and engines, and begin hanging them on a composite frame of the airplane being built in the Mojave Desert. "Dynetics is doing most of the integration work," says King, "and we are also building the mating interface system, which is the attach points, all the electric interfaces that send the commands to drop it and to light it, as well as all the fluid systems."

With the pressure on Huntsville to once again meet engineering challenges never before confronted, neither Wentz nor King are concerned. "There are plenty of trials ahead of us to be sure, but nothing insurmountable," King says. "Michael Griffin is a brilliant man and we have him as a technical advisor. We are confident it will work, we just have to go through the physics and make it work."

The Stratolaunch Systems team is scheduled to move into Dynetics' new \$50 million, 226,500-square-foot design, development and prototyping facility sometime in May. The company sights June 2013 on its horizon as the milestone for a critical design review, with a manufacturing phase to follow. Flight testing is projected for most of 2015. From there, most of the component parts - the rocket, the aircraft, and the integration of the rocket with the aircraft - should merge for a demonstration in late 2016-2017. At that time, Stratolaunch Systems plans to be regularly flying cargo and scientific equipment, as well as conducting experiments. Next, space tourists will come and go in 24-hour centers from a three-day orbit of the Earth.

In the meantime, construction continues on the new hangar in the Mojave Desert that will house the gigantic twin-boom Stratolaunch Systems carrier plane. Fifteen miles away, an un-manned SpaceX Dragon spacecraft powered by a Falcon 9 rocket was expected to have carried cargo to a waiting ISS in late April; and in Huntsville, Stratolaunch Systems is poised to make a big splash in the aerospace industry. ■

## Leveraging Today's Experience for Tomorrow's Challenges

- ◆ Acquisition Support
- ◆ Capabilities Development
- ◆ Security Operations
- ◆ Training & Systems Support
- ◆ Commercial Flying Service
- ◆ Foreign Military Sales
- ◆ Logistics Operations



ISO9001:2008/AS9100 Certified

0000282381-01

120116-01



4035 Chris Drive, Suite C  
Huntsville, Alabama 35802  
www.TorchTechnologies.com

**Celebrating Our  
10th Year!**

- ◆ Systems Engineering & Integration
- ◆ Modeling and Simulation
- ◆ Software Development
- ◆ Information Assurance
- ◆ Algorithm Development
- ◆ Interoperability
- ◆ Test & Evaluation

**100%  
Employee  
Owned**



EEOE/M/F/V/D

LIGHTING THE PATHWAY TO SUSTAIN OUR NATION'S FREEDOM

0000271827-01

## Davidson Technologies Inc.

- SYSTEMS ENGINEERING AND ANALYSIS
- MODELING AND SIMULATION
- SOFTWARE DEVELOPMENT AND IV&V
- TEST AND EVALUATION
- C2BMC/BMC4

"Our mission is to provide high-quality management, technical and engineering services to assist government and commercial customers in solving complex problems."

530 Discovery Dr. • Huntsville, AL 35806 • 256/922-0720

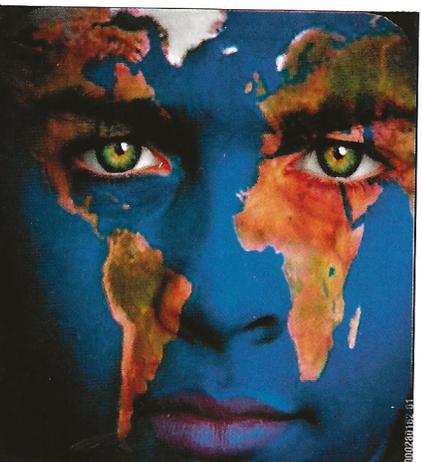
0000268948-01

**EXCELERATE**  
Worldwide Engineering & ITAR Solutions

International Defense  
Business Solutions Provider

ITAR & Engineering Support

256-325-4050  
www.ITARHelp.com



120028116-01