

Burt Rutan Testimony – Opening Statement

The House Committee on Science, Subcommittee on Space and Aeronautics
Hearing entitled **Future Markets for Commercial Space**

Wednesday, April 20, 2005, 9:30 AM
Room 2318, Rayburn House Office Building

Thank you for the invitation to address this important hearing. I will attempt to specifically address the subjects outlined in the invitation.

The markets for a future Personal Spaceflight industry (access to flight above the atmosphere by the public) will likely take on two basic forms: The first is a scenario in which commercial companies develop lower-cost versions of the classic government booster and spacecraft concepts and then conduct commercial flights that are funded by passenger ticket sales. This activity might properly be compared to the trekking outfits that take courageous adventurers to the top of Mount Everest; the activity survives even though more than 9% of those who have reached the summit have died on the mountain, with the recent rate still at 4%. The safety record for all of government manned space flight is hardly better; 4% fatality for those who have flown above the atmosphere, and the fatality rate for the last 20 years being much worse than the first 20 years. This first scenario's approach will result in a very limited market whose size will depend somewhat on the ticket prices. However, I do not believe this scenario will result in a significant volume of operations, being limited by the same factors that limit the Everest climbers. I believe these systems might begin commercial flights in 4 to 6 years flying maybe 50 to 100 astronauts the first year with the rate topping out at maybe 300 to 500 per year.

The second is a scenario in which the players do not find the dangers of space flight acceptable and recognize that extensive improvements in safety are more important than extensive improvements in affordability. Those that attack the problem from this viewpoint will be faced with a much greater technical challenge; the need for new innovations and breakthroughs. If successful, however, they will enjoy an enormous market, not one that is limited to servicing only a few courageous adventurers. It is likely that systems that come from this approach will be more like airplanes and will operate more like airplanes than the historic systems used for government manned spaceflight.

The future plans for my company regarding the new industry cannot be revealed since they are only at a preliminary stage of technical development. I can assure you that they do not involve a 'scenario one' approach, since we believe a proper goal for safety is the record that was achieved during the first 5 years of commercial scheduled airline service which, while exposing the passengers to high risks by today's standards, was more than 100 times as safe as government manned space flight. Achieving that goal requires new generic concepts; ones that will come from true research, not merely development programs like the ones we are seeing with NASA's exploration plans.

I can tell you that we do not yet have the breakthroughs that can promise adequate safety and cost for manned orbital flights. That is why our early focus will be on the suborbital Personal Spaceflight industry. Our recent SpaceShipOne research program did focus on the needs for safety breakthroughs by providing an air-launched operation in which the rocket propulsion is not safety critical and the 'care-free reentry' concept assures that flight control is not safety critical for atmospheric entry.

Another thing I can tell you is that our systems for the commercial Private Spaceflight industry will be focused on an early marketplace with multiple, competing spaceline operators in order to bring the experience to the largest possible audience. The airline experience has shown us that it is not just technology that provides safety, but the maturity that comes from a high level of flight activity. Airline safety increased by a factor of six within the first 5 years without an accompanying technology increase. I am not able to reveal the schedule for the introduction of our commercial systems. However, I believe that once the revenue business begins it will likely fly as many as 500 astronauts the first year. By the fifth year the rate will increase to about 3,000 astronauts per year and by the twelfth year of operations 50,000 to 100,000 astronauts will have enjoyed that black sky view.

Now that it has been shown that a small private company can indeed conduct robust, sub-orbital manned flights with an acceptable recurring cost, I do not believe that this industry will again be hampered by the inability to raise capital. The size of the potential market supports significant investment. The main barrier had been the perceived risk that the technical problems were not solvable. Those that develop systems that have generic features that point to poor safety will continue to have trouble finding capital, as they should. Our ability to find funding for our research program was certainly tied to the fact that we had a goal of not just to fly, but to fly a system that could immediately be developed for the commercial market. We have had no problem finding investors for our future program that involves the development and certification of commercial sub-orbital spaceships.

I believe the ability to insure will be greatly improved if the government steps up to the responsibility to require an operator to show his passenger safety by adequate flight and ground testing. Clearly, insurance will be expensive until it is shown that aggressive safety goals are indeed being achieved. With maturity I expect that safety will continuously improve, as it did with airliners.

Over the last 33 years my companies have developed 39 different manned aircraft types. All were developed via research flight tests flown over our California desert area and all flights were regulated by the FAA-AVR (the airplane folk, now AVS). We have never injured a test pilot, nor put the non-involved public or their property at risk. In spite of that record, the FAA insisted that the Office of Commercial Space Transportation (AST) impose their commercial launch license process on the last five flights of our 88-flight research test program. That would have been fine, except that their process bore no relation to that historically used for research testing. The AST process, focusing only on

the non-involved public, just about ruined my program. It resulted in cost overruns, increased the risk for my test pilots, did not reduce the risk to the non-involved public, destroyed our “always question, never defend” safety policy, and removed our opportunities to seek new innovative safety solutions. The main reason for this is that AST, with their history of only regulating the dangerous ‘scenario one’ type of systems, applied the process of protecting only the non-involved and had no process to deal with the safety and prediction of failure for manned aircraft. Their process deals primarily with the consequence of failure, where the aircraft regulatory process deals with reducing the probability of failure. The regulatory process was grossly misapplied for our research tests, and worse-yet is likely to be misapplied for the regulation of the future commercial spaceliners. The most dangerous misapplication might be stifling innovation by imposing standards and design guidelines, rather than the aircraft certification process that involves testing to show safety margins. AST has already used NASA and AIAA to develop design guidelines. This is an approach that must not be imposed on an industry that is still doing research. The AST launch license process might be applicable for the protection of those on the ground during flights of “scenario one” systems, but it will not work for the portion of the industry that promises growth and sustainability. Time here does not allow elaboration, so I must refer you to the handout.

A basic problem faced by the FAA in dealing with the regulatory tasks ahead is funding for hiring staff familiar with aircraft certification and commercial operations. The Administrator has told me that she is 300 short in staff needed for the current demands in regulating aircraft, thus it is impossible to shift the job of regulation of spacecraft like mine for “scenario two” to the aircraft organization (AVS) who will know how to regulate the systems being developed. This problem must be solved quickly to support an industry that needs a proper research test environment to allow innovation. The problem cannot be solved by adding staff at AST, since having more people applying the wrong processes is not the answer. I believe that they are overstaffed, to do the current launch license process. Much of the work done in an attempt to misapply the expendable-booster process to our aircraft was repeated numerous times with a staff that were not equipped to make relatively easy decisions and incapable of applying the needed waiver process. In fact, while my company was already flying initial test flights and waiting for time-critical responses from AST, during 2003 and 2004, AST found time to expend extensive resources processing and awarding a launch license to a company that did not even have a vehicle in construction, or even funding for the project!

We have spent considerable resources developing recommendations for specific regulatory processes to be applied to the new industry, but have not yet found interest within the FAA to consider them. We will continue our work to solve this problem and will hope to make progress within the next two years.

Thank you for your attention to my opening remarks. I will be happy to answer your questions.