Written by James Heiser on March 26, 2012

## SpaceX CEO: Mars Tourism May Cost \$500,000

Elon Musk made his $\$ 2$ billion fortune as a cofounder of Paypal; but when eBay purchased his company, he saw an opportunity to pursue a lifelong interest in human space flight. In 2002, Musk founded Space Exploration Technologies - SpaceX - with the intention of creating a lessexpensive alternative to the way things had been done in the aerospace industry since the beginning of the "Space Age." And SpaceX has begun delivering on Musk's dream: the successful launch of the Falcon 9 booster in 2010, and the successful test and
 upcoming April 30 launch of the Dragon capsule to the International Space Station (ISS) have been necessary tests of the new company, and thus far SpaceX has passed those tests - and done so in a way that earned the company a 12 -flight contract with NASA to fly supply missions to the ISS.

But Musk wants to see his company reach further out into the solar system. He wants to go to Mars. In fact, he wants everyone to be able to go who can afford the $\$ 500,000$ price tag. As the SpaceX CEO recently explained during a BBC broadcast:

My vision is for a fully reusable rocket transport system between Earth and Mars that is able to re-fuel on Mars - this is very important - so you don't have to carry the return fuel when you go there.

The whole system [must be] reusable - nothing is thrown away. That's very important because then you're just down to the cost of the propellant.

We will probably unveil the overall strategy later this year in a little more detail, but I'm quite confident that it could work and that ultimately we could offer a round trip to Mars that the average person could afford - let's say the average person after they've made some savings.

Granted, a half million dollars is more than simply "some savings." But it is several orders of magnitude less than the NASA estimate for the Space Exploration Initiative during the administration of George H.W. Bush. NASA offered up a pork-barrel $\$ 500$ billion program spread over 30 years to get to Mars. Musk's vision for travel to the Red Planet is tied to increasing the proportion of the rocket that is reusable. Despite the progress made in the shuttle program toward reusable space craft, the reality has fallen far short of what many space advocates hope will eventually be accomplished. An article for the UK Register ("Musk muses on middle-class Mars colony") explains both the goal which SpaceX is pursuing in keeping down the cost of launch, and the reason why reusability matters:

The "Holy Grail" he said, is to build a rocket which is totally reusable and could lift mass into orbit

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for around \$10-20 per pound. The Space Shuttle costs around $\$ 10,000$ per pound, but next year Musk plans to cut this to $\$ 1,000$ per pound using SpaceX's Falcon Heavy rocket, which can lift 53 tons per launch. This kind of economy was possible because of technological advances in design, avionics, engines, and launch operations, he said - although some of those came from NASA itself.
"If you think of any mode of transport, whether it's a plane, train, car, horse, bicycle, they are all really reusable," he said. "If you had to buy a new plane every time you went somewhere it would be incredibly expensive. A 747 costs around $\$ 300 \mathrm{~m}$ - and you'd need two of them for a round trip - and yet people aren't paying half a billion dollars to fly from LA to London, because that 747 can be used tens of thousands of times over."

It remains to be seen whether SpaceX's more ambitious goals for cost reduction and reusability can be accomplished. But private industry is already reducing the cost of space travel. And having a goal for space travel is more likely to continue the advance of science and expand human frontiers than would be likely with a space program guided first and foremost by bureaucratic survival.

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