

Deadly SpaceShipTwo crash follows explosion of unmanned Antares rocket

By Bryan Dyne
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The suborbital spacecraft VSS Enterprise, a SpaceShipTwo-class rocket, crashed in the Mojave Desert in the US during a test flight Friday, resulting in the death of one crew member and the injury of another.

Earlier this week, an unmanned Antares rocket from the Orbital Sciences Corporation exploded only a few seconds into its flight. Early reports suggest that the first stage of the launch vehicle failed, prompting the range safety officer to initiate an emergency depressurization of the rocket's fuel tanks, which caused the explosion.

The two space disasters in the span of one week highlight the growing prominence of private companies in space missions.

The SpaceShipTwo is owned by Richard Branson's Virgin Galactic, and the test flight was being conducted by Virgin Galactic's partner, Scaled Composites. This was the spacecraft's first manned flight since January.

There has been no official comment by Virgin Galactic or Scaled Composites on the cause of the crash. Virgin Galactic has so far only said that the craft "suffered a serious anomaly resulting in the loss of the vehicle." Eyewitness reports indicate that the vessel exploded just after its engine fired when it was dropped from its mother ship, White Knight Two.

There is speculation that the cause of the explosion was the engine, which was using a new plastic-based fuel that had up to this point only been tested on the ground.

The pilot killed in the SpaceShipTwo crash is the fourth fatality from the SpaceShipTwo program. Three others were killed in a 2007 explosion of an unattached rocket engine using the old rubber-based fuel. An investigation found that the three were standing too close to the rocket motor, in violation of safety

regulations.

SpaceShipTwo vehicles, first revealed to the public in 2009, were designed to be the first space tourism vessels. After being carried to a launch altitude of 15 kilometers, it uses a booster to ascend to 110 kilometers. This is 10 kilometers above the Kármán line, which is the formal definition of space. It stays at that altitude for only a few minutes, during which time the passengers would experience free fall and view the surface of Earth against the black of space. There are currently more than 700 individuals who have deposited the requisite \$200,000-250,000 to reserve a seat on a Virgin Galactic flight.

The Antares rocket, in contrast, was being operated by a company contracted by the National Aeronautics and Space Administration (NASA), a US government agency that relies heavily on private corporations. The rocket that exploded was on a mission to resupply the International Space Station.

The first-stage rockets used by Antares are refurbished Soviet NK-33 engines. Each one is a 40-year-old piece of equipment that was sold for \$1.1 million each to Aerojet, a company that works alongside Orbital Sciences to launch the rockets.

Being cheap is the only reason the NK-33 rockets are used. While innovative at the time, they are now far behind modern technology. There is also only a limited supply of the rockets in existence, meaning that unless Orbital can overcome the legal hurdles of using the old Soviet designs to make new rockets, the Antares family has a limited number of launches.

Furthermore, not only do Antares rockets require old Soviet hardware, Orbital currently uses Russian and Ukrainian labor to maintain and refurbish the rockets. Since the company does not have the expertise needed and would rather not use the more expensive workers

from NASA, large sections of the first-stage work of the Antares are contracted out to the Ukrainian Yuzhnoye Design Bureau.

Orbital Sciences is not the only private company to use Russian-built rockets to power their machines. The Atlas V of the United Launch Alliance uses a single RD-180 engine as its first-stage engine. Significantly, one of the main uses of the Atlas family of rockets is to put US military satellites into orbit. In response to rising tensions between the US and Russia over the US-backed coup in Ukraine, Russian Deputy Prime Minister Dmitry Rogozin declared in May that, “Russia will ban the United States from using Russian-made rocket engines for military launches.”

While the causes of the two disasters this week are still under investigation, both involve private companies operating on the basis of the profit motive, with a consequent interest in cutting costs.

While NASA has always relied heavily on contractors, and in particular military contractors, the increasing privatization of spaceflight accelerated in the 1990s and particularly in the 2000s. It has been continued under the Obama administration, which cancelled the Constellation program and shut down the shuttle program. Any manned missions launched by NASA will be asteroid missions, which are slated to begin in 2025 at the earliest. Manned flights to Mars have been sequestered indefinitely.

Not only has privatization led to cost cutting, but the basic purpose of space flight has shifted from scientific endeavors to space tourism and similar operations. To date, no fundamentally new technologies have been developed by Virgin Galactic. The “hybrid” motor’s primary advantage is cheapness, and it has yet to be reliably and regularly operated.

Moreover, the vehicle only ever reaches 13 percent of the velocity required to get to orbit, and thus is not developing a technology that is applicable to actually staying in space. Given that such altitudes were reached in an earlier period by figures such as Auguste Piccard and Joseph Kittinger, who did tests for cosmic rays and high-altitude parachutes respectively, there is no new science being done. Given the high price tag for rides, moreover, the “space” plane is only accessible to the very wealthy.

Other companies such as Boeing and SpaceX are also looking into private manned spaceflight, but their

programs are less developed than Virgin Galactic.

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