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BUSINESS

SpaceX Signs First Customer for Launch of Refurbished Rocket

Satellite operator SES agrees to launch one of its large commercial spacecraft



The recovered first stage of a Falcon 9 rocket is transported to the SpaceX hangar at the Kennedy Space Center in Cape Canaveral, Fla., in May. The company says reusable technology eventually will allow more frequent and significantly less expensive launches of all types of spacecraft. *PHOTO: JOE SKIPPER/REUTERS*

By **ANDY PASZTOR**

Aug. 30, 2016 6:00 p.m. ET

Satellite operator SES SA has agreed to launch one of its large commercial spacecraft on a refurbished Space Exploration Technologies Corp. rocket, marking another advance for reusable boosters.

Scheduled to occur before the end of the year, the mission announced on Tuesday will be the first one to use the lower stage and nine main engines of a Falcon 9 rocket that experienced the rigors of a blastoff and acceleration through the atmosphere on a previous launch. No other commercial space company or military contractor has achieved such a landmark by recovering and reusing the entire lower stage intact, after an initial orbital flight.

Officials of SpaceX, as the Southern California company is called, have been eager to demonstrate such reusable technology, which they describe as a game changer that eventually will allow more frequent and significantly less expensive launches of all types

of spacecraft. SpaceX officials have talked about ultimately being able to launch spacecraft at a faster tempo—and for a fraction of their current prices, which typically start at roughly \$60 million.

The company so far has returned the main lower portions of six Falcon 9 rockets, by landing them vertically on land or on a specially outfitted floating ocean platform. The booster destined to carry the SES satellite lifted an unmanned cargo capsule toward the international space station in April.

SpaceX officials also have said the engines of boosters that have returned to Earth proved to be in excellent shape, requiring little refurbishment. The engines are slated to undergo extensive analysis, including repeated test firings on the ground, before being readied for repeat launches. Senior SpaceX officials have predicted that Falcon 9 engines could end up being reused multiple times—potentially up to dozens of missions, and other experts have concurred.

SpaceX founder and Chief Executive Elon Musk hasn't said how much it is likely to cost to put used boosters back into service, nor has he indicated the extent of discounts available for customers willing to sign up for such launches. Overall, the company has signaled relatively little refurbishment work is expected to be necessary. Detailed structural and other tests are continuing on another returned booster, which experienced the highest re-entry forces.

The U.S. military remains cool to the general concept because it is reluctant to trust its expensive satellites to recycled boosters until the technology is proven. Claire Leon, the Air Force's top rocket-acquisition official, told a space-industry conference in May: "It's going to be a long time before we can actually say we're going to reuse a rocket." Some satellite industry consultants and SpaceX critics have argued that the company has a long way to go to demonstrate the benefits and most of all, the reliability, of reusable rockets.

But commercial satellite operators generally have been more supportive, and in recent months, SES officials have talked up the potential benefits of reusing boosters. The upcoming mission is intended, among other things, to demonstrate that a blue-chip customer is willing to accept a previously used rocket with a relatively short turnaround time to get it ready for another launch.

SpaceX officials also are betting that the Pentagon and other U.S. government customers, which are independently studying broader reusability questions, gradually will follow the lead of SES.

The decision by Luxembourg-based SES, which operates more than 50 large commercial satellites in high-Earth orbit, is particularly significant for several reasons. The move comes despite the fact that the company's satellite-deployment plans have been disrupted by previous slips in SpaceX launch schedules.

SES, which years ago was the first commercial operator to launch with SpaceX, also has a reputation for technical expertise and long has been viewed by the rest of the industry as exercising caution in adopting new technologies.

As a result, the upcoming launch could help convince other operators, SpaceX customers and insurance providers that reusable rockets are likely to be a major trend.

In its press release, SES called the recycled booster a "flight-proven Falcon 9." Martin Halliwell, chief technology officer at SES, said: "We believe reusable rockets will open up a new era of spaceflight, and make access to space more efficient in terms of cost and manifest management."

In Tuesday's joint release, Gwynne Shotwell, president and chief operating officer of SpaceX, said "relaunching a rocket that has already delivered spacecraft to orbit is an important milestone on the path to complete and rapid reusability."

One technical issue industry that officials are likely to be watching closely is whether additional tests and work may be needed before relaunching boosters that previously placed satellites into orbits requiring extra propulsion. Those boosters follow faster trajectories, and undergo greater stresses, when returning to land.

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