

FUTURE TECH

low-Earth orbit, identifying and pursuing activities that foster new and emerging markets, and quantifying NASA's long-term demand for activities in low-Earth orbit. Through these combined efforts, NASA aims to meet its long-term needs in low-Earth orbit well beyond the International Space Station's life. The agency's ultimate goal in low-Earth orbit is to partner with industry to achieve a strong ecosystem in which NASA is one of many customers purchasing services and capabilities at a lower cost. More than 50 companies are already conducting commercial research and development on the space station via the International Space Station U.S. National Laboratory. NASA has also worked with ten different companies to install more than 14 commercial facilities on the station that support research and development projects for NASA and the ISS National Lab. This effort is intended to broaden the scope of commercial activity on the space station beyond the ISS National Lab mandate, which is limited to research and development. NASA aims to enable commercial manufacturing and production and allow both NASA and private astronauts to conduct new commercial activities aboard the orbiting laboratory. Additionally, NASA plans to allow private astronaut missions of up to

30 days on the International Space Station. Considering the market demand, the agency intends to accommodate up to two short-duration private astronaut missions per year to the International Space Station. These missions will be privately funded, dedicated commercial spaceflights that will use a U.S. spacecraft developed under NASA's Commercial Crew Program.

From a broader perspective, the industry implications of commercial space travel remain various and promising. Demand for space travel among those that can afford it may rise significantly as barriers to entry decline. Moreover, the development of new spacecraft will encourage growth within the manufacturing sector because of the vast supply chains in spacecraft manufacturing. For the space economy to take off, countries will also need to put regulations in place that ensure safety and reliability in many areas, including vehicle safety and debris mitigation. In the future of space tourism, the commercial space travel industry has unbounded potential. However, whether SpaceX or anybody else can offer orbital flight for humans at a price that can actually yield a profit, SpaceX's crew launch brings humanity closer towards the viability of accessible commercial space travel.



Launch Complex 39A

Launch Complex 39A (LC-39A) was initially built for the Apollo/Saturn V rockets that launched American astronauts on their historic journeys to the Moon and back. Since the late 1960s, Pads A and B at Kennedy Space Center's Launch Complex 39 have served as backdrops for America's most significant human spaceflight endeavors—Apollo, Skylab, Apollo-Soyuz, and the space shuttle.

In 2014, Space Exploration Services, or SpaceX, signed a property agreement with NASA for use and operation of LC-39A for 20 years, part of Kennedy Space Center's transition to a multiuser spaceport. SpaceX modified LC-39A to adapt it to the needs of the company's Falcon 9 and Falcon Heavy rockets. SpaceX constructed a Horizontal Integration Facility near the pad's perimeter where rockets are processed for launch prior to rollout to the pad for liftoff. The Transporter Erector (TE)

is used to move the Crew Dragon spacecraft to the top of the Falcon 9 rocket on the launchpad. Standing 212 feet high—more than 20 stories—the TE moves launch-ready rockets and spacecraft from the processing hangar at the base of the pad up to the pad surface and into a vertical position over the flame trench. The TE is a much larger and stronger version of the erector the company uses at Space Launch Complex 40 and is used to process and launch Falcon Heavy rockets.

The first SpaceX launch from LC-39A was SpaceX's 10th Commercial Resupply Services mission to the International Space Station, known as CRS-10. The launch on Falcon 9 took place on February 19, 2017 and carried supplies and research to the space station. Since then, CRS-11 and CRS-12 have also launched from LC-39A. SpaceX will use LC-39A for its Crew Dragon missions to the International Space Station.

