

The XCOR Lynx Program: Capabilities for a Suborbital Market

XCOR Aerospace is a spacecraft and rocket engine design and manufacturing company currently based in Mojave, California and expanding to Midland, Texas and Kennedy Space Center in Florida. XCOR's first spacecraft, the XCOR Lynx Mark I, will begin its flight test program this year (2014). Lynx is XCOR's entry into the commercial reusable launch vehicle market. This two-seat, piloted spacecraft will provide multi-mission suborbital spaceflights for research and education missions (REM) and private individuals.

Lynx Mark I is a prototype that will be put into commercial service upon completion of flight tests. Lynx Mark II, the production version of Lynx, will have higher performance than Mark I, while Lynx Mark III is specially designed to carry an external, top-mounted, dorsal pod that can hold upper stages capable of inserting a small satellite into LEO; carry an oversized payload experiment, space telescope, or other remote sensing device; and advance readiness of new on-orbit spacecraft and instrumentation in development. Lynx aircraft-like capabilities allow high tempo operations, up to four flights per day, rapid call-up, and fast turnaround between flights.

Commercial suborbital reusable launch vehicles will provide low-cost, flexible, and frequent access to space. In the case of XCOR's Lynx, the vehicle design and REM capabilities work well for hosting specially designed experiments that can be flown with a human-tended researcher or alone with the pilot on a customized flight trajectory, which means each flight can be entirely dedicated to the researcher's mission. Lynx reusability will allow for repeated observations with a single instrument, but without the need to refurbish the vehicle between flights. The short turn-around means a researcher can do multiple observations, measurements, or targets. All Lynx vehicles are designed to fly primary and secondary payloads for research in solar physics, astrophysics, upper atmospheric science, and planetary and earth observation, as well as microgravity experiments in life, material, and physical sciences. Lynx Mark III small satellite missions will be capable of launching a 10 kg satellite from a US site into a circular, 450 km orbit within 24 hours of a defined need.

Lynx and similar commercial spaceflight vehicles will drive strong market adoption and unleash revolutionary innovations in space-based research and instrumentation development, and satellite design, applications, and operations. This paper presents an overview of Lynx research and education missions, applications for small satellite missions, and the innovation potential this disruptive technology brings to the suborbital market.