# AEROSPACE

AMERICA

# 2024 YEAR-IN-REVIEW

## FOUR FIRSTS FOR ROCKETS

**Vulcan Centaur**
DEBUTED JAN. 12

**H3** FIRST CUSTOMER LAUNCH, JULY 1

**Ariane 6**
DEBUTED JULY 9

**Super Heavy**
TOWER CATCH, OCT. 13

**PLUS**

Boom's first flight and dozens of other breakthroughs

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AIAA
SHAPING THE FUTURE OF AEROSPACE

# Drone deliveries, high-speed aircraft and human spaceflight captivate the public

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The **Society and Aerospace Technology Outreach Committee** examines the relationship between aerospace and society.

Highlights of this year's intersections of society and aerospace technologies included advancements in drone deliveries to consumers, progress on a supersonic aircraft designed not to startle the public with sonic booms, the conclusion of a simulated crewed Mars mission, fascination with a malfunctioning spacecraft and the first private spacewalk.

In July, **FAA** for the first time authorized **beyond-visual-line-of-sight drone flights** by multiple commercial operators in the same airspace. FAA cleared **Zipline** and Alphabet subsidiary **Wing**, both of California, to deliver packages from Walmart stores in the Dallas/Fort Worth, Texas, area to nearby customers, relying on their **uncrewed aircraft traffic management systems** to share data and flight routes to help keep the drones safely separated. In the future, such technology could help enable routine flights where one remote pilot oversees multiple drones flying beyond the pilot's visual line of sight.

In the supersonic flight regime, **NASA** and **Lockheed Martin** in January publicly unveiled the **X-59** at Lockheed Martin Skunk Works' facility in Palmdale, California. This experimental research aircraft is meant to demonstrate a means of reducing the sharp crack of the sonic booms produced by traveling faster than the speed of sound to a gentler "thump." Features of the X-59 designed for quieter supersonic flight include a long, tapered nose and a top-mounted engine. In Octber, engine-run tests began to verify the performance of X-59's systems under its own engine power. NASA now plans for initial flight tests to commence in early 2025, after which pilots will fly X-59 over several U.S. cities to measure the aircraft's sonic thumps and how the public perceives them. The information could lead to the end of FAA's ban on supersonic flight over land by civil aircraft.

Turning to simulated spaceflight on land, a four-person volunteer crew in July concluded **NASA's first year-long analog mission** of a long-duration stay on Mars. Research scientist Kelly Haston, engineer Ross Brockwell, physician Nathan Jones and microbiologist Anca Selariu lived in a **3D-printed Martian habitat** at **NASA's Johnson Space Center** in Houston. They conducted spacewalks, operated robots, maintained their habitat, exercised, grew crops, gave haircuts and contended with communication delays of up to 44 minutes when contacting mission controllers, friends and family. As NASA prepares to return astronauts to the moon and later send humans to Mars, such analog missions can help the agency refine its plans and determine how the conditions of living in another world affect human health and performance.

As part of NASA's Commercial Crew program, a Boeing **Starliner** capsule in June carried astronauts **Barry "Butch" Wilmore and Suni Williams** to the **International Space Station** for the design's first flight with crew. While en route to ISS, several thrusters malfunctioned. After testing and reviews, NASA decided in August that Wilmore and Williams will remain on orbit until February, when they are to return in a SpaceX **Crew Dragon**. The unoccupied Starliner capsule undocked from ISS in September and landed in White Sands Missile Range in New Mexico.

▼ Jared Isaacman partially exits a SpaceX Crew Dragon capsule, becoming the first private citizen to conduct a stand-up extravehicular activity. During this excursion, Isaacman and SpaceX engineer Sarah Gillis took turns evaluating the mobility of their SpaceX suits, an upgraded version of the design that nearly 50 astronauts have worn during trips to and from the International Space Station.

Polaris Program

In a leap forward for commercial spaceflight, two members of the four-person **Polaris Dawn** crew in September performed the first private spacewalk. At an altitude of about 700 kilometers, the hatch on a SpaceX Crew Dragon capsule was opened, exposing **Jared Isaacman, Scott Poteet, Sarah Gillis and Anna Menon** to the vacuum of space. Isaacman, the billionaire founder of Shift4 who founded the flight, and Gillis, a SpaceX engineer, took turns partially exiting the capsule. During their nearly five days in low-Earth orbit, the crew reached a maximum altitude of 1,400 kilometers, the farthest that humans have traveled from Earth since the Apollo 17 lunar landing in 1972. ★