



Commercial Crew Program (CCP) Status



Commercial Crew Program Continuing Safe Operations in 2024



Crewed Rotation Complete SpaceX Crew-7 to SpaceX Crew-8 Handover

Goal: Provide safe transport of NASA & International Partner crew members & cargo to the International Space Station in support of a 6-month science & research expedition.



Boeing Developmental Flight Test Complete Crew Flight Test (CFT)

Goal: Obtain remaining system performance data required for NASA certification ahead of crewed rotation missions to the International Space Station.



Crewed Rotation On Deck SpaceX Crew-8 to SpaceX Crew-9 Handover

Goal: Provide safe transport of NASA & International Partner crew members & cargo to the International Space Station in support of a 6-month science & research expedition.





Crew Flight Test Overview (Prelaunch to Station Rendezvous)



Crew: Butch Wilmore (Commander) and Suni Williams (Pilot)

Boeing's Starliner successfully launched atop a United Launch Alliance Atlas V rocket & reached orbit without incident on June 5.

- NASA expects all flight test objectives associated with the prelaunch phase to be confirmed complete following post-flight data reviews.
- Completed objectives involving activities with the crew and critical support from integrated ground teams to execute a crewed launch countdown, scrub, and/or prelaunch contingency as needed.

Significant accomplishments were also completed during the launch and rendezvous phases of flight.

- Starliner ground teams and test pilots completed key objectives in testing manual and automated navigation, assessing spacecraft thruster performance, and successfully executing manual piloting demonstrations for evaluating crew controls, displays, and response timing.

Inflight Observations: Performance issues were identified in Starliner's service module propulsion system during free flight and rendezvous with the space station.

- Small Helium system leaks were observed, in addition to the one cleared prior to launch.
- Fail offs of five reaction control system thrusters. Operations teams performed a series of hot-fire tests which re-enabled four of the five thrusters.



Crew Flight Test Overview (On-orbit Testing & Decision-Making)



Starliner successfully completed an autonomous docking to the forward-facing port of the station's Harmony module on June 6.

- Significant accomplishments were completed during the docked phase of flight including the execution of normal hatch open/close procedures, transfers of equipment, spacecraft low-power mode configurations, and "Safe Haven" operations.

While Starliner remained safely docked to station, teams performed extensive testing & analysis to evaluate Starliner's performance & return readiness.

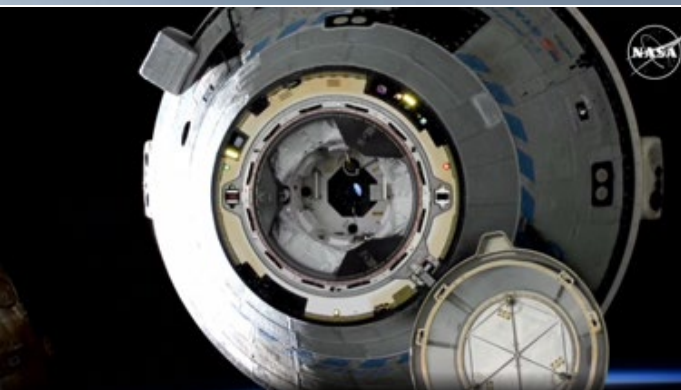
- NASA & Boeing conducted additional in-space and ground testing to study system mechanics, establish probable cause, and better predict performance for the return flight.
- An extensive fault tree investigation was initiated and independent experts from across the agency and Boeing provided their assessments and recommendations.

CCP worked to enable an effective NASA decision-making process to evaluate a crewed return without schedule pressure or compressed timelines.

- CCP engaged with ISS and commercial partners on contingency planning & operational flexibility. The program worked closely with independent Technical Authorities and NASA's Engineering and Safety Center to analyze performance data, evaluate risk, and make the best, safest decision possible.
- **Ultimately, the Agency decided to return Starliner uncrewed.**



Crew Flight Test Overview (Return & Path Forward)



Starliner completed an uncrewed autonomous undocking from station on September 6, followed by a successful de-orbit, spacecraft separation, descent, landing and recovery on September 7.

- Overall, Starliner performed well across all major systems in the undock, deorbit, and landing sequences.
 - The service module propulsion system performed well. Helium system leaks remained in family requiring no inflight management and service module thrusters remained healthy.
- NASA is fortunate to have instrumentation and data collection capability to allow most of the return test flight objectives to be met, even without a crew.
- As a result of the extended flight test duration, considerable lessons have also been learned that will benefit NASA and Boeing in support of Starliner rotation missions.

Forward Work Toward Certification:

- A complete list of remaining certification requirements will be determined upon completion of post-flight data reviews.
- NASA will work to validate system performance and assess long-term solutions to the propulsion system issues encountered on this flight.
- NASA will complete a thorough, independent investigation into the CFT anomalies and determine any lessons learned for future flights and other NASA development programs.



Crew-8 Status



Crew: Matthew Dominick (NASA), Michael Barratt (NASA), Jeanette Epps (NASA), Alexander Grebenkin (Roscosmos)

SpaceX successfully launched March 3, 2024, and docked to ISS March 5, 2024

- The March 2 launch attempt was scrubbed due to weather.
- First-flight Falcon 9 Booster, nominal performance through ascent.
- Successful booster return to Landing Zone-1 following stage separation.

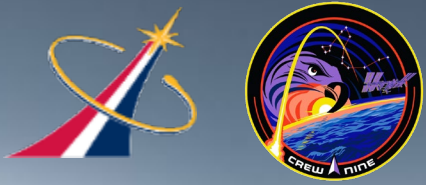
Dragon Endeavour is healthy docked to station & operating within the flight rules.

- Upon ascent, all Dragon rendezvous and docking burns were executed nominally
- To date, Dragon's weekly checkouts confirm all systems nominal
- Return expected in early October: 210 day on-orbit extension to accommodate a direct handover with Crew-9 was approved for an additional 30 days.

Contingency Planning: CCP worked with SpaceX to provide an emergency return configuration for 2+ crew until Crew-9 arrives.

- Efforts built upon work done previously in support of station crew.
- Approved Dragon configuration uses a temporary seats constructed on Dragon's cargo pallets.
- In the unlikely event of a station emergency, CFT astronauts would return wearing compression garments. NASA determined compression garments to be the preferred option when considering safety, crew comfort, and habitability.





Crew-9 Status



CCP worked with SpaceX to replan the Crew-9 mission to launch two crew members in late September instead of four.

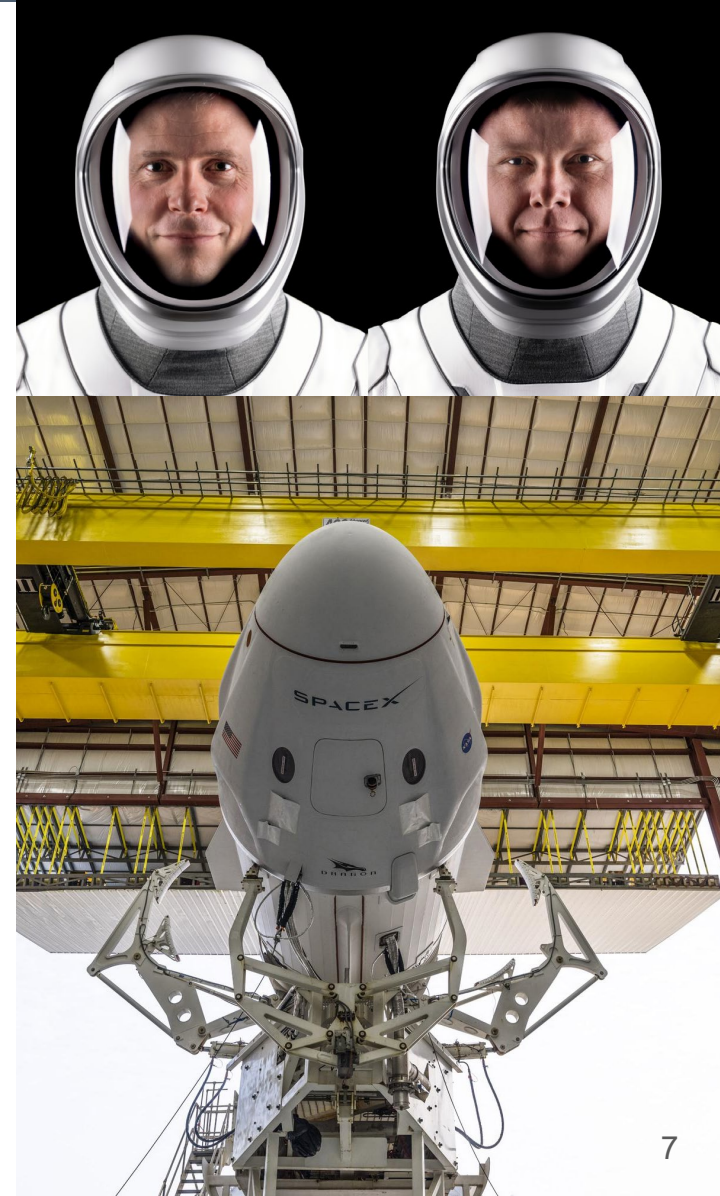
The CFT astronauts will join Expedition 71/72 and return to Earth aboard Crew-9 at the conclusion of the increment in late February 2025.

Launching on Crew-9: Nick Hague (NASA) & Aleksandr Gorbunov (Roscosmos)

- Dragon is configured with two open seats to return the additional crew.
- Additional training performed with crew and ground teams.
- William's Dragon flight suit on station, Wilmore's Dragon flight suit to launch on Crew-9.

Hardware & Ground Status:

- Dragon capsule and trunk are mated at the Cape and preparing for integration with Falcon 9.
- Falcon 9 booster completed a successful first flight in August. Modifications to Falcon 9 upper stage following the Starlink g9-3 anomaly complete.
- CCP plans to launch Crew-9 from Space Launch Complex-40 at Cape Canaveral Space Force Station to deconflict with pad preparations for NASA's Europa Clipper mission at near by pad 39A.
- CCP certification of SLC-40 ground systems nearing completion.





Crew-10 Status



Crew: Anne McClain (NASA), Nichole Ayers (NASA), Takuya Onishi (JAXA), Kirill Peskov (Roscosmos)

Launch Planned for NET February 2025

- Following a short handover with Crew-10, Crew-9 will return to Earth.
- Hardware processing for the Dragon capsule and Falcon 9 rocket on track.
- Planning to have both Launch Complex 39A and Space Launch Complex-40 available for operational flexibility.

NASA is working with SpaceX to shift future Dragon recovery operations for crew and cargo to the West Coast.

- Dragon recovery operations to occur in the Pacific Ocean off the coast of California.
- To help ensure a controlled reentry of the Dragon trunk, SpaceX is implementing a software change to separate the trunk after the deorbit burn, causing it to land safely up-range of the crew capsule in an unpopulated area of the Pacific ocean.
- Pacific landings for CCP mission could begin as early as Crew-10, pending operational readiness and completion of NASA's certification process.
- This change is also expected to add operational flexibility with respect to landing weather criteria as Pacific sites tend to be within the “go” criteria more often than with Florida sites.

