

Commercial Cargo Resupply Services to the International Space Station

Under an agreement with NASA, Northrop Grumman is using a Falcon 9 rocket and Cygnus spacecraft to deliver nearly 3,750 kilograms of cargo and supplies to the astronaut crew aboard the International Space Station (ISS).

6 DEPARTURE AND DESTRUCTIVE RE-ENTRY

After departure from the ISS, Cygnus completes its mission

- Secondary missions (e.g., satellite deployments, on-board experiments and vehicle performance demonstrations) are performed
- At the end of its mission, the Cygnus safely destructs upon re-entry into Earth's atmosphere

1 MANUFACTURING AND ASSEMBLY

Northrop Grumman and a network of world-class suppliers manufacture the elements for Cygnus

Cygnus Spacecraft

- Pressurized cargo module - Thales Alenia Space Italia, Turin, Italy
- Service module - Northrop Grumman, Dulles, Virginia
- Space Station cargo - NASA

2 PREPARATION FOR LAUNCH

Hardware arrives at the Cape Canaveral Space Force Station in Florida and is integrated on site

- Cygnus pressurized cargo module is mated to the service module
- Cargo is loaded in Cygnus
- Cygnus is fueled and mated with Falcon 9
- Additional time-critical cargo is loaded into Cygnus before launch
- Falcon 9 is erected on Space Launch Complex 40 and fueled for launch

5 CARGO DELIVERY TO THE SPACE STATION

Using the ISS's robotic arm, astronauts capture and berth Cygnus to the Station

- The crew unloads ascent cargo
- Cygnus can be berthed to the ISS for up to 180 days
- Cygnus performs ISS reboost
- Cygnus supports Extend-the-Lab science payloads
- Cygnus is loaded with disposal cargo
- Unpressurized cargo is loaded onto Cygnus at up to two external locations

4 SPACE STATION RENDEZVOUS

After separation from Falcon 9, Cygnus raises its orbit to rendezvous with the International Space Station

- The service module uses GPS and Laser imaging technology to automatically approach within 12 meters of the ISS

3 LAUNCH

Falcon 9 launches from Space Launch Complex 40 on an approximately 10-minute mission to deliver Cygnus to its target orbit