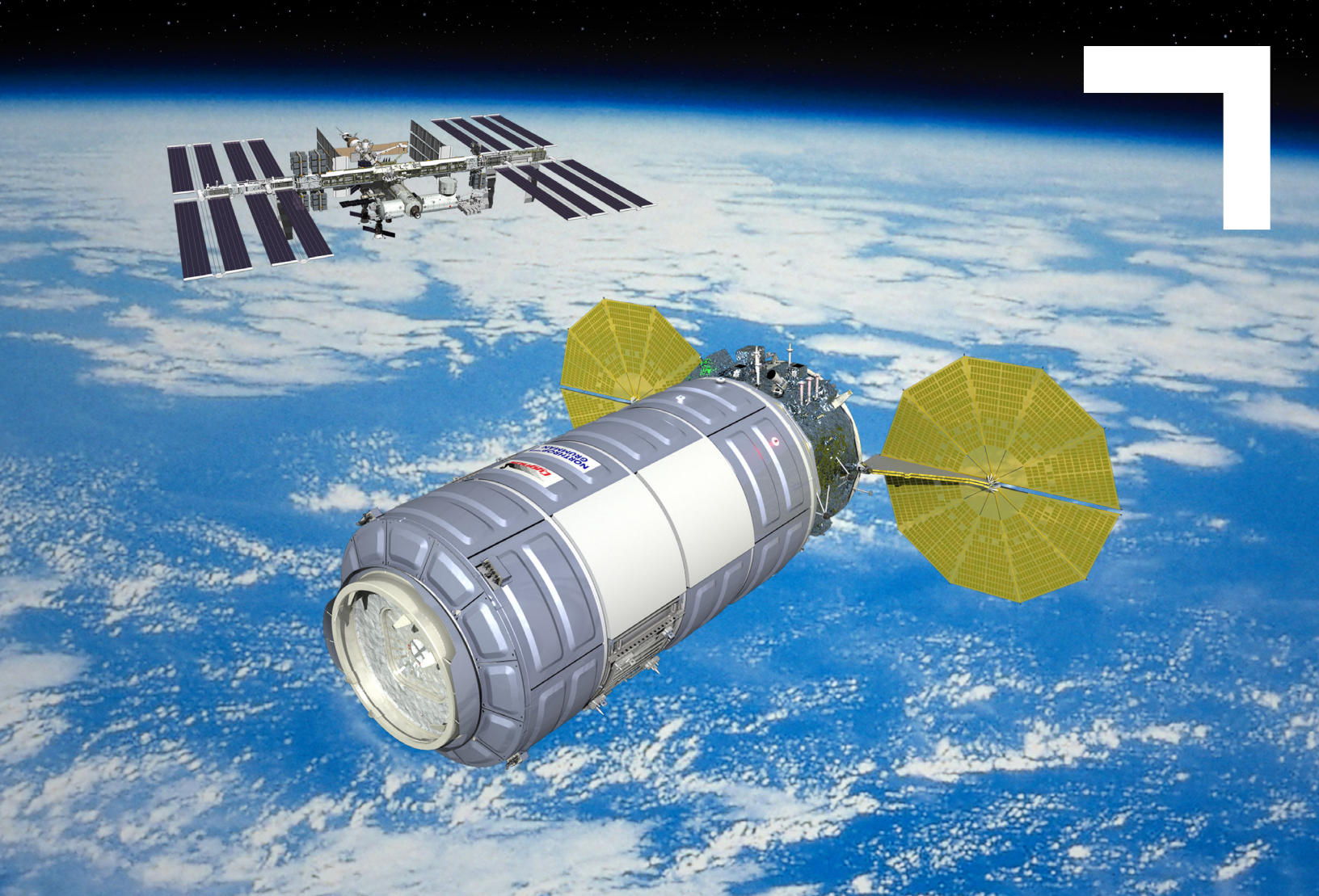




CYGNUS™

Logistics Services in Low Earth Orbit and Beyond

Northrop Grumman is a leading innovator of logistics capabilities in space. The company's Cygnus spacecraft has a proven track record of cargo delivery missions and can carry out additional logistics operations to support mission needs in low-Earth orbit or deep space. The Cygnus spacecraft, innovative cargo loading processes, and mission support are hallmarks of Northrop Grumman's commitment to advancing human spaceflight and the commercial space economy.

SPECIAL DELIVERIES 200+ MILES UP

To ensure critical cargo safely and reliably reaches the International Space Station (ISS), Northrop Grumman pioneered technologies for commercial resupply services and has been meeting NASA's logistics needs for more than 10 years. Cygnus has performed

18 successful missions, delivering more than 58,000 kg (130,000 pounds) of equipment, science experiments, and supplies to sustain the ISS astronauts under NASA's Commercial Resupply Services (CRS and CRS-2) contracts.

CYGNUS DESIGN

Cygnus consists of a Service Module and a Pressurized Cargo Module that carries crew supplies, equipment and scientific experiments to destinations in low-Earth orbit. The Service Module incorporates advanced avionics developed by Northrop Grumman and guidance and navigation components that allow for fully autonomous rendezvous operations. The avionics design fully meets rigorous and exhaustive NASA safety requirements imposed on human-rated space vehicles. The Pressurized Cargo Module is manufactured by Thales Alenia Space specifically for Cygnus.

Cygnus has evolved from its original configuration with several design improvements to enable it to carry more cargo. With

increased demand for station logistical services in LEO, a new version with a larger Pressurized Cargo Module increases capabilities for cargo delivery and added trash disposal.

LOGISTICS AND HABITATS CAPABILITIES

Cygnus is a defining feature of Northrop Grumman's logistics and habitats capabilities. Over the last decade, the spacecraft's design has been updated to meet the needs of the customer, including adding reboost capability, improving late-load capability, increasing cargo mass capacity and supporting secondary missions.

The Cygnus design is the foundational basis for spacecraft to support the next generation of space exploration missions, from delivery and logistics services to commercial space stations and other commercial low-Earth orbit ventures, to deep space logistics to the moon and beyond.



CYGNUS™

SPECIFICATIONS

SERVICE MODULE

Power Generation:	2 fixed wing UltraFlex™ solar arrays, ZTJ Gallium Arsenide cells
Power Output:	3.5 kW
Propellant:	Dual-mode N ₂ H ₄ / MON-3 or N ₂ H ₄

PRESSURIZED CARGO MODULE

Heritage:	Multi-Purpose Logistics Module
Total Cargo Mass:	Up to 5,000 kg
Pressurized Volume:	36 m ³
Berthing:	Common Berthing Mechanism (CBM)

Future capability
includes docking



Cygnus is compatible with multiple launch vehicles including Northrop Grumman's Antares 330 and Medium Launch Vehicle (MLV) currently in development

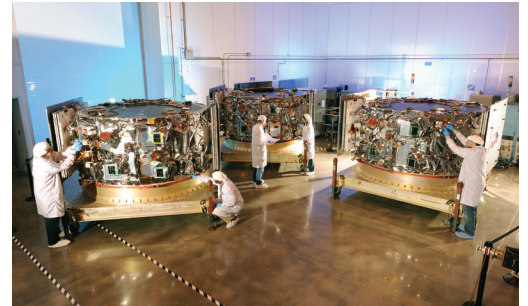
MORE INFORMATION

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The Cygnus Service Module is manufactured in Northrop Grumman's Dulles, Virginia facility.



The Cygnus Service Module is mated with the Pressurized Cargo Module at the launch site



Northrop Grumman provides complete cargo loading and mission support services for your mission



Deep Space Cygnus Concept

**NORTHROP
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