

The Eagle™ Spacecraft Heritage

An evolution of flight-proven design

The Eagle spacecraft product line is based on Northrop Grumman's highly successful portfolio of proven spacecraft that range from low Earth orbit (LEO), medium Earth orbit (MEO), highly elliptical orbit (HEO) and geosynchronous orbit (GEO) to beyond Earth missions to the moon and L2 Lagrange point.

The product line consists of the Eagle-S spacecraft, which uses an EELV Secondary Payload Adapter (ESPA) as its structure; the low-cost, flexible, small Eagle-1M spacecraft bus that implements a modular, plug and play avionics architecture; the redundant, affordable, mid-size Eagle-2 spacecraft; and the Eagle-3 spacecraft, designed for missions requiring high reliability, substantial payload capacity, and operational mission performance.

The Eagle-S spacecraft is designed to be a secondary payload and share launch costs with another program. The Lunar CRater Observation and Sensing Satellite (LCROSS) demonstrated the advantages of rideshare by completing a mission to the moon in 2009 at a fraction of the cost of a typical deep space mission.

The avionics at the core of LCROSS have a legacy of several NASA missions with 100 percent mission success. The Eagle-2 spacecraft uses the same core avionics and design architecture as the Eagle-S bus while scaling the spacecraft size and redundancy levels to align with customer needs. The Eagle-1M spacecraft is derived from the Modular Space Vehicle (MSV) program, which is the first spacecraft to implement Space Plug-and-Play Avionics (SPA) standards developed by an industry consortium in

conjunction with the Air Force Research Laboratory and the Department of Defense Operationally Responsive Space office.

Northrop Grumman spacecraft provided a low-cost yet highly reliable platform to enable NASA's Total Ozone Mapping Spectrometer-Earth Probe (TOMS-EP), Korea's Multi-Purpose Satellite (KOMPSAT), and the Republic of China's ROCSAT-1 to fulfill their missions well beyond their planned lives. The lessons of design for affordability and the use of common designs across these missions have been carried forward to Northrop Grumman's current generation of Eagle spacecraft.

The Eagle-3 spacecraft extends the Eagle family to more demanding Class-A national asset missions involving larger payloads, longer life, high reliability, and highest level of mission assurance while maintaining focus on affordability. The Eagle-3 bus leverages designs from a common platform used for NASA's highly successful Aqua and Aura missions that continue to meet mission requirements with more than 20 years of combined service to date, updated and modernized for current missions such as James Webb Space Telescope (JWST) and restricted customer programs.

The Eagle product line leverages Northrop Grumman's flight-proven products and processes and history of success from more than 50 years of spacecraft heritage. The Eagle spacecraft series is the latest generation of affordable, flexible and reliable products ready to meet any mission needs.

Space Vehicle Production

Trusted manufacturing and testing

Northrop Grumman's Space Park site in Redondo Beach, Calif., serves as the primary production center for the Eagle spacecraft.

The Space Vehicle Production Facility, part of a 725,000-square-foot satellite production complex, can support up to eight satellites in production simultaneously. This COMSEC-certified facility is the area where assembly, integration and test of Northrop Grumman's full range of spacecraft are performed.

The facility includes multiple high bays capable of either Class 100,000 or Class 10,000 operations as well as all the facilities required for environmental testing, such as acoustic, thermal vacuum and vibration.

Over the years, Northrop Grumman's world-class facilities and comprehensive testing have contributed to unprecedented operational lifetimes of more than 200 military, communications and scientific satellites flown in every kind of space environment and orbit.

For more information, please contact:

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Multi-Payload Platform

EOS Aqua

EOS Aura



Small Spacecraft Series

TOMS-EP

KOMPSAT-1

ROCSAT-1



LCROSS (Eagle-S)



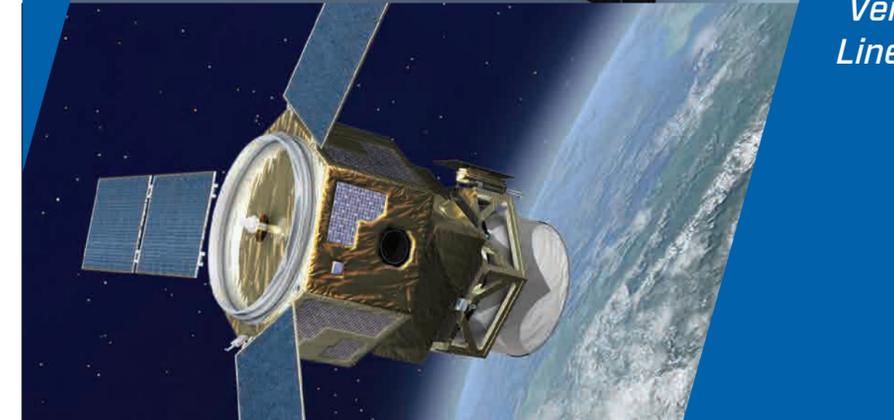
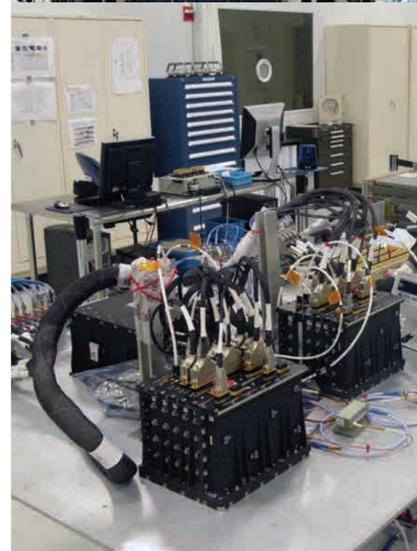
Eagle Spacecraft Family

Eagle-3

Eagle-2

Eagle-1M

Eagle-S



**Eagle™
Spacecraft
Products**

*Northrop Grumman's
Versatile, Affordable
Line of Spacecraft*

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

Eagle™ Spacecraft

One family to efficiently satisfy a range of missions

Northrop Grumman's Eagle spacecraft product line is designed to meet the growing market demand for affordable and reliable spacecraft capable of supporting a variety of mission applications.

With a rich legacy of building space platforms that range from small low Earth orbit spacecraft to large observatories and deep space probes, Northrop Grumman has combined elements of these proven products into a family of Eagle spacecraft to readily serve the mission needs of customers at an affordable price.

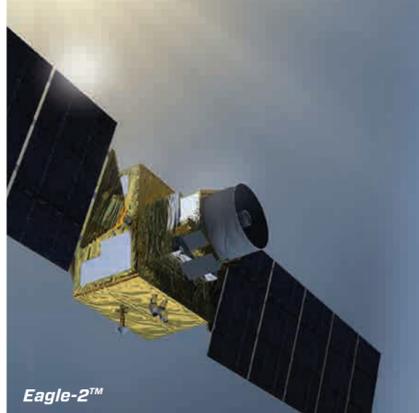
The Eagle spacecraft product line consists of four basic configurations, each suited for a particular class of mission. Design and product commonality across the Eagle configurations enable low cost and rapid delivery, while maintaining Northrop Grumman's commitment to reliability and mission success.

The Eagle spacecraft employ a flexible design that allows performance to be cost-efficiently tailored with existing, flight-proven component options to meet unique mission requirements, including solutions that may go beyond the standard Eagle configurations.

Whether it's a one-way journey to the moon, a study of Earth's environment, or a critical operational mission, the Eagle spacecraft line provides an affordable, rapid and reliable platform to accomplish your mission.



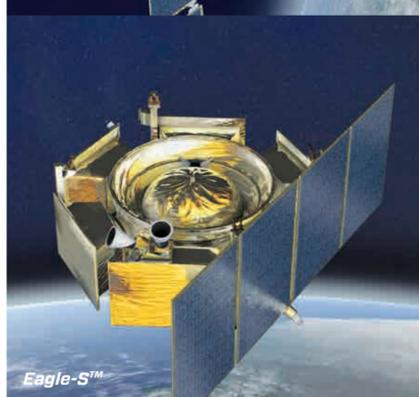
Eagle-3™



Eagle-2™



Eagle-1M™



Eagle-S™

Flexible Design

Efficiently adaptable for unique mission requirements

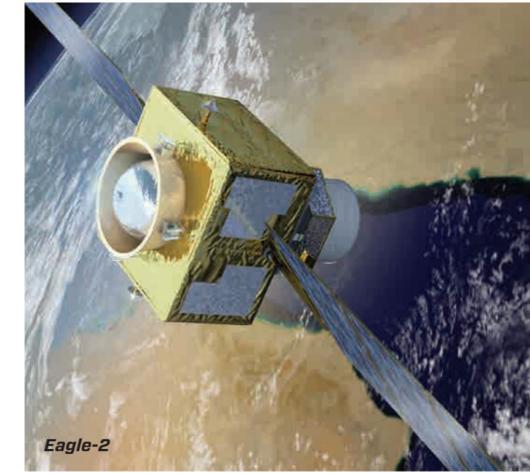
The Eagle spacecraft product-line approach focuses on satisfying requirements for applications across a spectrum of missions with standard products that maximize design commonality to achieve cost efficiencies.

The Eagle spacecraft family provides customers with affordable choices for their mission needs, while incorporating modularity and interfaces to readily accommodate options for missions requiring higher performance.

Tailoring options from our existing flight-proven products include increased pointing accuracy, high rate communications, added levels of redundancy, and optimizing payload power, data storage, and propellant to the specific mission.

The standard Eagle spacecraft are designed for adaptation to LEO, MEO, HEO, GEO or deep space applications, with minimal configuration modifications.

By building in accommodations for likely mission tailoring needs, the Eagle spacecraft product line provides customers with a selection of appropriate options to meet demanding performance requirements, while retaining the low-cost benefits of the core Eagle product line.



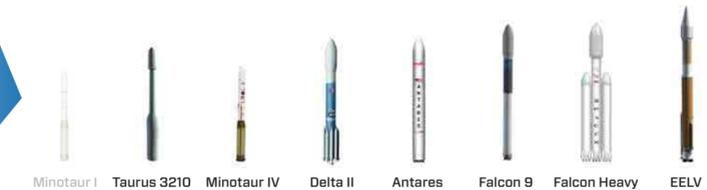
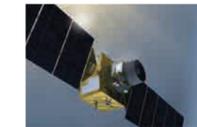
Eagle-2

Optimal Eagle Spacecraft and Launch Vehicle Matching

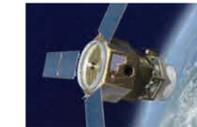
Eagle-3™



Eagle-2™



Eagle-1M™



Eagle-S™

