

AstroMesh®

Unfurlable Mesh Antenna

Flawless Performance with 100% On-Orbit Success

The state-of-the-art AstroMesh® unfurlable mesh antenna reflector technology is the most advanced and reliable large aperture deployable reflector available. Apertures can range from 3 to 22 meters in diameter, covering radio frequencies UHF to beyond Ka-band. The AstroMesh® performance record is unmatched with its reflectors deploying successfully on-orbit without incident or failure. AstroMesh® can be integrated easily into any spacecraft configuration and with best in class compaction rates, AstroMesh® can be stowed for the most challenging launch envelopes.

Benefits of Unfurlable Reflectors

- Large unfurlable reflectors are able to communicate with small terminals
- Multiple design configurations allow for customizable solutions
- Deployment risk is low due to flight-proven reflector designs
- Increased frequency reuse for high-throughput satellite communication is possible
 - Cost per bit is reduced by large unfurlable mesh reflectors

AstroMesh® Configurations

The AstroMesh® family is designed for a broad spectrum of applications. Aperture sizes can range from 3 to 22 meters.

AM-1 Class

- Scalable from 6 to 22 meters
- Reduced diameter versus 1st generation AM
- Extensive flight heritage

AM-2 Class

- Optimized design for 18 meters and above
- Reduced stowed height by 40% from AM-1
- Deployed truss configuration identical to AM-1

AM-Lite Class

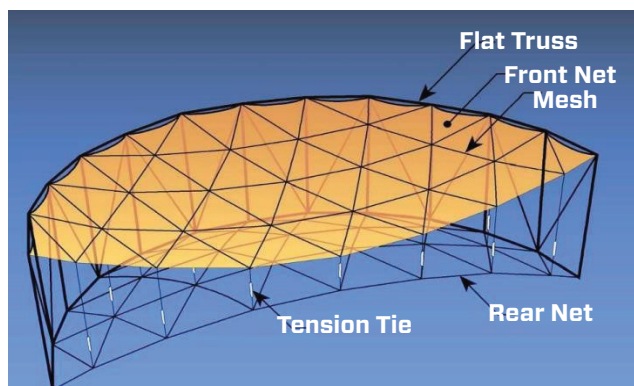
- Optimized mass design for 3 to 8 meters
- 50% reduction in mass from AM-1
- High frequency performance efficiency verified: 55% at 31 GHz & 45% at 50 GHz for 5.2-meter reflector

Unfurlable Mesh Antenna for UHF through V-Band Applications

AstroMesh® Advantages

- Over 85 years of collective on-orbit success
- 10 units have deployed on-orbit and are performing flawlessly
- Multiple programs in development
- Mesh surface accuracies proven at Ka-band and beyond for high-throughput satellite (HTS) communications
- Perimeter truss structure is inherently stiffer and lighter than competing technologies
- The perimeter truss and mesh surface design allow for unprecedented packing efficiency
- The first mesh reflector successfully used for a science mission
- The first and only rotating mesh reflector on orbit for the SMAP mission
- Controlled and predictable deployments proven by 100 percent on-orbit success--a claim no competing technology can make

- Deployment kinematics that are verifiable in a 1g environment with simple, standard, gravity compensation methods
- Stiff, robust, lightweight and reliable flight proven deployment booms and pointing mechanisms
- A proven PIM-free design and in-house PIM testing capabilities

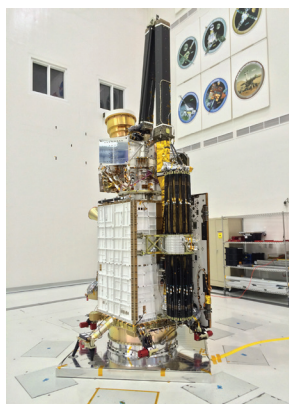


The design of Astro's proprietary AstroMesh® makes it the most advanced and reliable mesh reflector technology available.

PIM-free Performance	Proven from UHF to Ka band at high incident power levels
Shadowing	Up to 85% optical transparency
RF Performance	Proven up to 65 Ghz
Aperture Sizes Possible	3 to 22 meters
Ka Band Aperture Sizes	3 to 22 meters
Surface Accuracy and Reflectance Performance	Up to and beyond Ka band with surface accuracy better than 0.3 mm RMS
Mounting Options	Edge-mounted for superior stiffness



The Inmarsat 4 spacecraft with the integrated AM-1 reflector and boom



The SMAP spacecraft with the integrated AM-Lite reflector and boom

About Astro Aerospace

Astro Aerospace (www.northropgrumman.com/astro) is the leading supplier of space deployable technology and structures. Our pioneering designs have enabled critical and complex missions to Earth's orbit, Mars, and beyond. Astro's hardware is characterized by its efficient light weight structural design and robust deployment kinematics. Our state-of-the-art facilities in Southern California are capable of producing unfurlable mesh reflectors up to 22 meters in aperture size. Since 1958, Astro Aerospace has successfully deployed hardware on hundreds of space flights with a 100 percent success rate, a testament to Northrop Grumman's commitment to reliability, quality, and affordability.

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Printed in USA

17-0077 · AS · 1/17

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