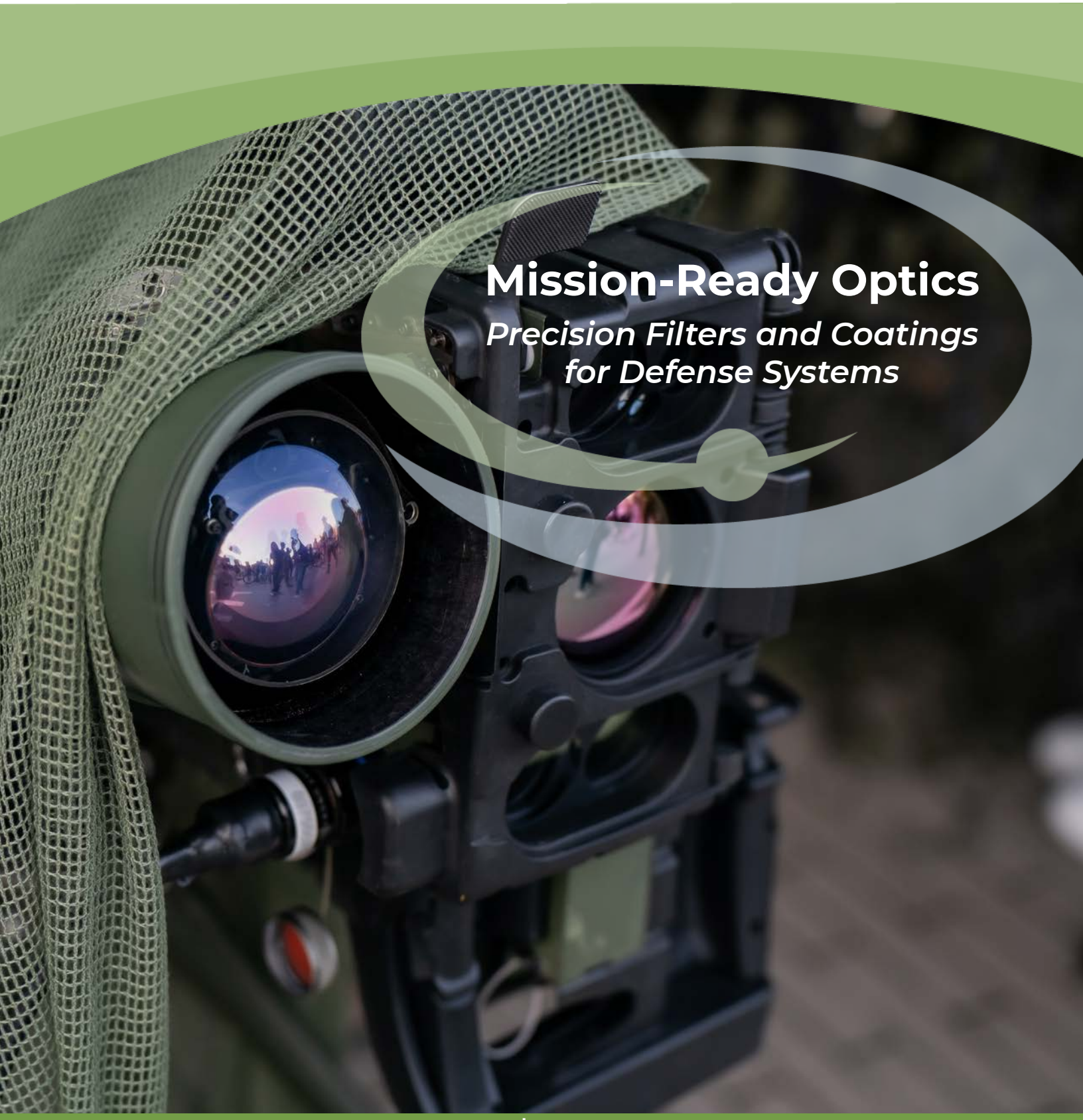
Andover Corporation

Celebrating 50 Years

A Legacy of Quality
Focused on the Future



Mission-Ready Optics

Precision Filters and Coatings for Defense Systems

Optical Capabilites for Defense

Filters and coatings for mission-critical systems

Defense and Surveillance Optics

Expert Engineering. Mission-Critical Reliability. Trusted by Defense Leaders

Our Capabilities At-a-Glance

- **Wavelength Range:** 193nm to 15µm (UV through LWIR)
- **Laser Line Solutions:** Multi-channel filters for targeting and rangefinding applications
- **Bandwidths:** From ultra-wide to <5 angstroms
- **Sizes:** Small-format UAV optics to large-aperture surveillance systems (2-300mm)
- **High Laser Damage Thresholds:** Engineered for durability with YAG and eye-safe lasers
- **Parallelism:** ≤ 5 arc seconds

Experienced in Defense Applications

- **Custom and Standard Filters:**
  Tailored to your specifications—no minimum order quantities required.
- **Redundant Production Equipment:**
  Ensures rapid turnaround and no downtime
- **Wide Material Compatibility:**
  We work with a broad range of substrates to meet the most demanding mission requirements, including:

- BK7
- Fused Silica
- Filter Glass
- Sapphire
- Chalcogenide Glass
- Germanium
- Zinc Sulfide
- Zinc Selenide
- Silicon
- Calcium Fluoride
- Barium Fluoride
- Magnesium Fluoride

Optical Capabilites for Defense

Filters and coatings for mission-critical systems

From targeting pods and ISR sensors to surveillance satellites, optical components must perform reliably in harsh environments, with complex system requirements.

Defense primes and integrators rely on Andover for filters, coatings, and optical assemblies built to withstand these conditions.

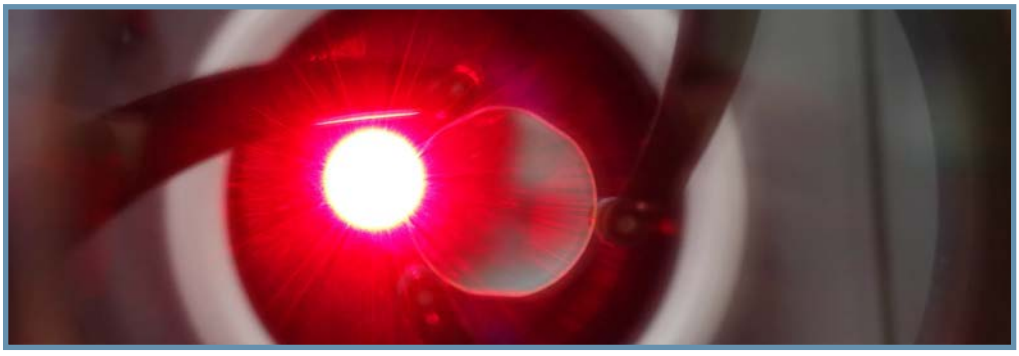
Built for Demanding Operational Environments

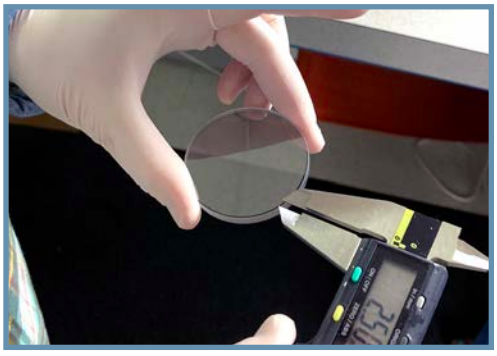
- **First-Surface Hardcoats**
  Durable sputtered coatings for long-term exposure to severe conditions, including diamond-like carbon (DLC) coatings.
  *Qualified to **MIL-C-48497** severe abrasion, **MIL-F-4146** moderate abrasion, and related military durability standards.*

- **Low-Scatter Optical Surfaces**
  Polished to the most stringent surface quality and transmitted wavefront specs.
  *Verified by laser interferometry and microscope inspection to **MIL-C-675**.*

- **Environmental Durability**
  Engineered to withstand vibration, temperature extremes, and humidity, in ground-based, airborne, and spaceborne systems.
  Validated through environmental cycling, thermal shock, and humidity chamber testing.

- **Space-Qualified Construction**
  Radiation-hardened, low-outgassing materials compatible with spaceflight.
  Conforming to NASA ASTM E595 standards and in-house bake-out testing.





Metrology to Meet the Mission

Andover's advanced in-house testing capabilities ensure that **every** optical component performs as specified:

- **Spectral transmission and blocking verification**
- **Surface quality and transmitted wavefront error**
- **Flatness and parallelism**
- **Adhesion, abrasion, and environmental testing**
- **Coating uniformity and angle-of-incidence (AOI) shift control**

nqa ISO 9001 QUALITY MANAGEMENT

nqa AS9100 AEROSPACE & DEFENSE

ITAR International Traffic in Arms Regulations Compliant

Optics for Defense

Notable Projects and Missions

L3HARRIS™
FAST. FORWARD.

WESCAM MX-Series ISR Camera Pods

Delivered optical components for multi-sensor surveillance pods deployed across over 200 airborne and naval ISR platforms.

Collins Aerospace
An RTX Business

Remote Vision System (RVS 2.0)
C-130 Interior Lighting

Optical components supporting RVS for the KC-46A Pegasus aerial refueling aircraft, as well as color filters for C-130 interior lighting.

BOEING

C-17 Globemaster III Landing Lights

Developed specialized heat-control filters and housings for military transport aircraft landing light systems.

LOCKHEED MARTIN

Apache AH-64 M-TADS/PNVS

Supplied optical filters for integrated targeting and pilot night-vision system, in over 800 active aircraft worldwide.

Sniper Advanced Targeting Pod (ATP)

Delivered precision optical filters supporting targeting and ISR operations on over 1,600 aircraft for the US and 28 allied nations.

F35 Joint Strike Fighter

Supplied custom optical filters supporting advanced sensor performance.

Targeting Pod Optics

High-performance optics for airborne targeting systems

Targeting pods combine imaging, tracking, and laser designation within compact airborne systems. These optical components support infrared and laser wavelengths with high transmission, strong out-of-band blocking, and long-term durability.

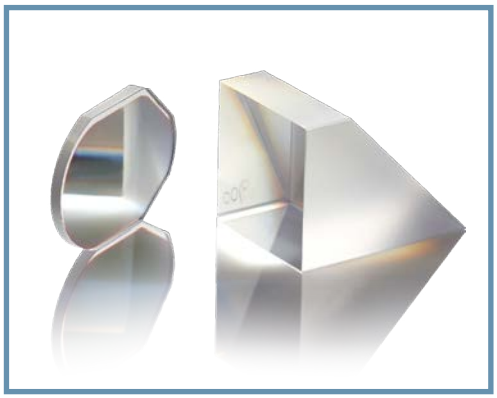
Key considerations:

- **Multi-sensor targeting system integration**
- **Mid-IR and laser-based sensing**
- **Hard oxides for airborne durability**
- **Stability under temperature cycling and vibration**
- **Compatibility with compact assemblies**

Beamsplitters and Mirrors

Optical path management components used to direct and balance multiple sensor channels in compact airborne targeting systems.

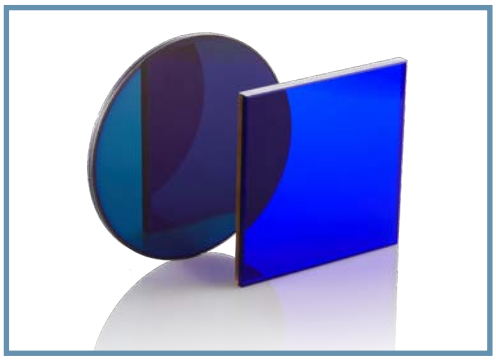
- Efficient routing of imaging, tracking, and laser-support optical paths
- Support precise integration within multi-function pod architectures
- Stable performance in rugged flight environments



Imaging Filters

Precision imaging filters for airborne targeting platforms, fabricated to maintain image clarity, transmitted wavefront quality, and spectral control in demanding optical systems.

- Transmitted wavefront typically $\lambda/4$ per inch or better
- Parallelism of 30 arc seconds or better
- AR-coatings to reduce ghosting and improve throughput
- Suitable for high-resolution imaging assemblies



AR-Coated Optical Components

Anti-reflective coatings applied to key optical surfaces to improve throughput and reduce optical loss across the system.

- Increase transmission through complex optical assemblies
- Reduce stray reflections that affect sensor clarity and system performance
- Support custom components used in integrated defense platforms

Infrared Imaging and Sensing

Optical components for demanding IR defense systems

Infrared imaging systems support surveillance, targeting, navigation, and threat detection when visible imaging is limited by darkness, smoke, haze, or adverse weather.

Andover provides infrared filters, AR coatings, and custom optical coatings for SWIR, MWIR, and LWIR system architectures.

Defense IR applications include:

- **Thermal weapon sights**
- **ISR and surveillance systems**
- **Target acquisition and tracking**
- **UAV and airborne IR payloads**
- **Navigation in degraded visual environments**
- **Border and perimeter surveillance**

Standard Infrared Bandpass Filters

Standard IR bandpass filters are designed for high transmission and deep rejection of unwanted wavelengths, available in narrow or wide bandwidths and customizable for application-specific requirements.

- Wavelength Range: 2 - 15µm
- Bandwidth Options: 1% to 50% of center wavelength
- Transmission: >85% typical
- Blocking: OD3 average

Custom Infrared Coatings

Custom coating options for anti-reflective performance, selective transmission, spectral blocking, and beam management within complex IR optical paths.

- Bandpass, long-pass, short-pass, and dichroic designs
- Typically optimized for AOI from 0° to 45°
- Customizable for specific angular requirements
- Dual-band coatings
- Dichroic beamsplitters
- Ultra-narrowband filters with bandwidths to <5 angstroms

UAV and Drone Imaging

Infrared filters and coatings support UAV and drone imaging systems used for surveillance, reconnaissance, and target detection. These payloads often require compact, lightweight optical solutions with stable spectral performance and airborne durability.

Infrared Imaging and Sensing

Optical components for demanding IR defense systems

False-color infrared imagery reveals thermal and spectral contrast beyond the visible spectrum, supporting detection, tracking, and situational awareness in challenging environments.

IR Defense Systems

Infrared filters and coatings support defense sensing platforms including IR cameras, FLIR systems, thermal weapon sights, forward weapon sights, and airborne or drone-based imaging payloads. These systems rely on spectral control, transmission efficiency, and durable optical surfaces for detection, visibility, and target discrimination.

IR Materials and Substrates

Andover provides custom infrared coatings on a wide range of materials used in defense sensing systems, including

- Germanium
- Chalcogenide glass
- Silicon
- Sapphire
- Zinc Sulfide
- Zinc Selenide
- Calcium Fluoride

Material selection depends on transmission requirements, environmental exposure, system weight, and overall optical design.

Chalcogenide glass is an alternative to germanium where lower weight, material availability, or broader design flexibility are important.

High-Efficiency AR (HEAR) and Protective Coatings

Broadband AR (BBAR) coatings help reduce reflection losses on key IR substrates, improving throughput and preserving image quality across complex sensing systems. Protective options such as Diamond-Like Carbon (DLC) add surface durability where abrasion resistance is needed.

- Improve transmission across critical IR optical surfaces
- Reduce reflection losses that affect system efficiency and image quality
- Add surface protection for rugged IR applications

Vision Systems & Displays

Optical components for displays, lighting, and visibility

Defense vision systems and displays rely on optical filters and coatings for readability, color control, and low-light performance.

From operator displays and illuminated controls to aircraft lighting systems, these components help manage transmission, reflection, and spectral output.

Vision system applications include:

- **Heads-Up display (HUD) optics**
- **Display panels and illuminated controls**
- **NVIS-compatible lighting systems**
- **Interior and exterior aircraft lighting**
- **Operator display and visibility optics**
- **Night vision and low-light visibility**

NVIS-Compatible Lighting and Display Optics

Filters and coatings for NVIS-compatible displays, illuminated controls, and related low-light systems.

- Controlled visible transmission with strong NIR blocking
- Spectral control for NVIS-compatible operation
- Includes hot mirrors, color filters, and AR-coated optics

Color Filters and Display Coatings

Optical filters and coatings for display readability, color control, and visual performance across HUDs, instrument panels, and other operator-facing systems.

- Conform to **MIL-STD-3009** requirements
- Manage spectral output for controlled color and contrast
- Maintain display clarity in bright and low-light environments

Hot Mirrors and IR-Cut Filters

Ideal for managing infrared energy in display and camera-based systems, including IR-cut filters for CCD camera systems using silicon-based detectors.

- Block unwanted IR energy in display and imaging systems
- Support CCD camera systems using silicon-based detectors
- Improve image quality, color balance, and thermal control

Vision Systems & Displays

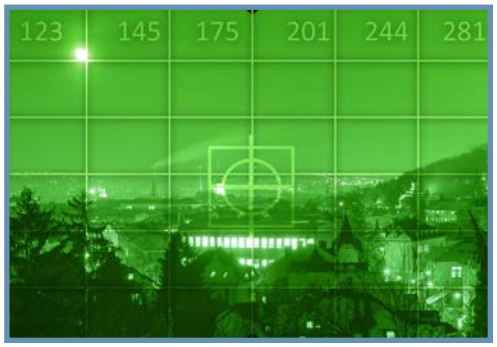
Optical components for displays, lighting, and visibility

Clear, reliable visual information is critical to situational awareness, safe operation, and mission effectiveness.

Vision System Integration

HUDs, display panels, illuminated controls, and related visibility systems often rely on multiple optical components working together. Filters and coatings help support visual consistency across integrated operator-facing systems.

- Integration across displays, lighting, and visibility-related optics
- Helps balance color control, clarity, and spectral performance
- Tailored for custom aerospace and defense requirements



Night Vision (NVIS) and Low-Light Visibility

Optical components used in NVIS and low-light visibility systems must control transmission and spectral behavior to preserve image clarity in changing light conditions.

- Optimal low-light visibility and image clarity
- Manages transmission and spectral behavior in night operations
- Ideal for rugged aerospace and defense visibility systems

Durable Coated Components

Vision and display systems often require optical components that hold up under vibration, abrasion, and long-term use. Andover supports these applications with hard-coated filters, DLC coatings, and related optical solutions for durability and custom integration.

- Includes hard oxides filters for rugged aerospace and defense environments
- DLC coatings provide unmatched abrasion resistance and surface protection
- Available for custom optical components, windows, and display-related geometries

UAV & Drone Optics

Solutions for compact airborne sensing systems

UAV and drone-based sensing systems rely on optical components that fit within tight payload constraints.

From ISR and reconnaissance platforms to multispectral imaging and target detection systems, these applications depend on filters, coatings, and optical assemblies suited to flight.

UAV optical applications include:

- **Airborne ISR and reconnaissance**
- **Compact EO/IR payloads and gimbals**
- **Border and perimeter surveillance**
- **Target detection and tracking**
- **Navigation and situational awareness**
- **Multispectral sensing systems**

Lightweight Filters and Coatings

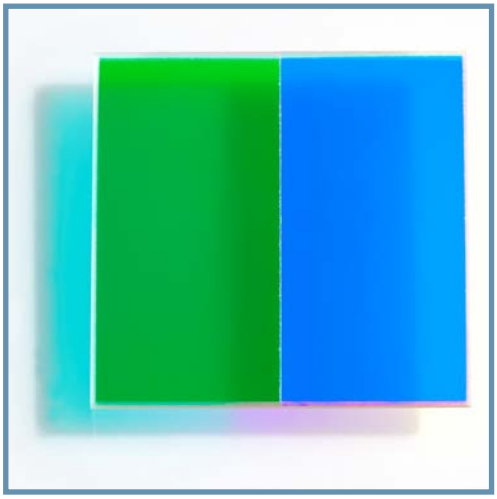
Optical filters and coatings for airborne payloads, stabilized gimbals, and compact sensing systems that must balance spectral performance with tight size and weight constraints.

- Excellent spectral control across visible, SWIR, and MWIR applications
- Helps optimize payload efficiency
- Built for temperature variation, vibration, and flight conditions

Compact Optical Assemblies and Payload Integration

For sensing systems that integrate multiple components into tightly packaged architectures, our optical solutions include:

- Mosaics for wide-field imaging and sensing
- Beamsplitter assemblies
- Multi-element sub-assemblies optimized for lower weight, reduced distortion, and component protection



Assemblies such as mosaics can combine multiple optical functions within a compact, lightweight package, at optimal size, weight, and performance.

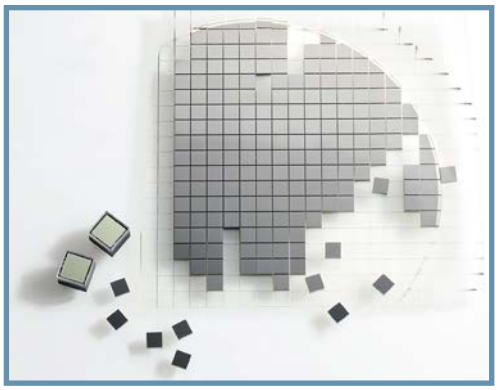
UAV & Drone Optics

Solutions for compact airborne sensing systems

SWaP-Conscious Design

Unmanned airborne systems often place strict limits on size, weight, and payload complexity. Andover supports these constraints with in-house fabrication capabilities ranging from 2 mm to 350 mm, including optical filter dicing down to 1.0 mm squares.

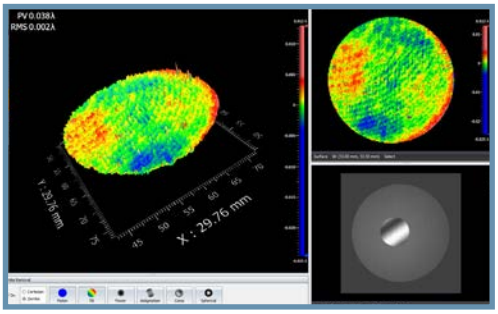
- Solutions for size- and weight-sensitive payload designs
- Ideal for limited payload envelopes
- Tailored for compact airborne system integration



Airborne Optical Performance

UAV and drone payloads must maintain image quality under vibration, motion, and changing environmental conditions. Andover's polishing and fabrication capabilities include transmitted wavefront errors down to 1/10 wave and parallelism within a few seconds of arc, supporting compact airborne sensing systems.

- Helps maintain alignment and image quality in flight
- Supports compact payload architectures
- Applicable to aerospace and defense systems



Interferometer surface map showing a reflected wavefront with peak-to-valley (PV) of 0.038λ and RMS of 0.002λ

Laser-Based Targeting Systems

Optical components for targeting and rangefinding

In laser-based targeting systems, optical performance depends on more than transmission alone.

Filters, coatings, and optical assemblies must help isolate the wavelength of interest, block competing light, and maintain reliable performance in compact defense systems exposed to vibration, temperature shifts, and harsh field conditions.

Laser-based applications include:

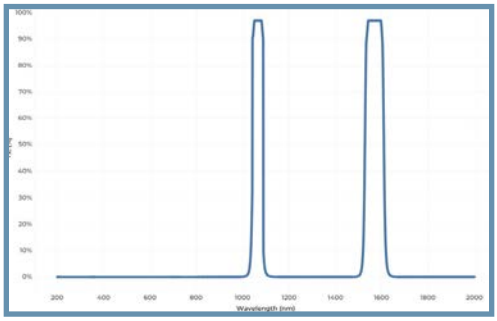
- **Laser rangefinders**
- **YAG targeting and alignment systems**
- **Weapon-mounted sighting systems**
- **Thermal and low-light weapon optics**
- **Airborne laser sensing**
- **Eye-safe laser applications**

Laser Line Filters and Spectral-Control

Precision optical filters for laser-based targeting, rangefinding, and alignment systems where selective transmission, visible blocking, and stable spectral performance are essential. Available designs can include narrowband, dual-band, and other solutions for both pulse and continuous-wave laser applications.

- Precise wavelength selection and signal integrity
- Customizable for visible blocking, bandwidth control, and angle-of-incidence requirements
- For targeting, rangefinding, alignment, and eye-safe laser system architectures

Laser rangefinder



Dual-band coatings

Hard-coated narrowband filter

High-LDT Coatings and Rugged Optical Components

Laser-based targeting systems require optical components that combine precise spectral performance with durability under demanding operating conditions. High-LDT coatings and rugged optical solutions help support thermal stability, environmental durability, and reliable performance in compact defense architectures.

- Laser damage resistance and thermal stability
- Helps maintain reliable optical performance in harsh field conditions
- For compact targeting, rangefinding, and weapon-adjacent system designs

Laser-Based Targeting Systems

Optical components for targeting and rangefinding

Laser Wavelength	Common Defense Applications	Typical Filter Types
905nm	• Compact ranging and sensing	• Narrow bandpass • Wideband bandpass
940nm	• Short-range sensing • VCSEL-based illumination	• Bandpass or notch
1064nm	• YAG laser targeting, alignment, and rangefinding	• Bandpass with AR coatings
1550nm	• Eye-safe laser systems	• Narrow bandpass or notch • Beamsplitter

Key optical design considerations for laser and LiDAR systems:

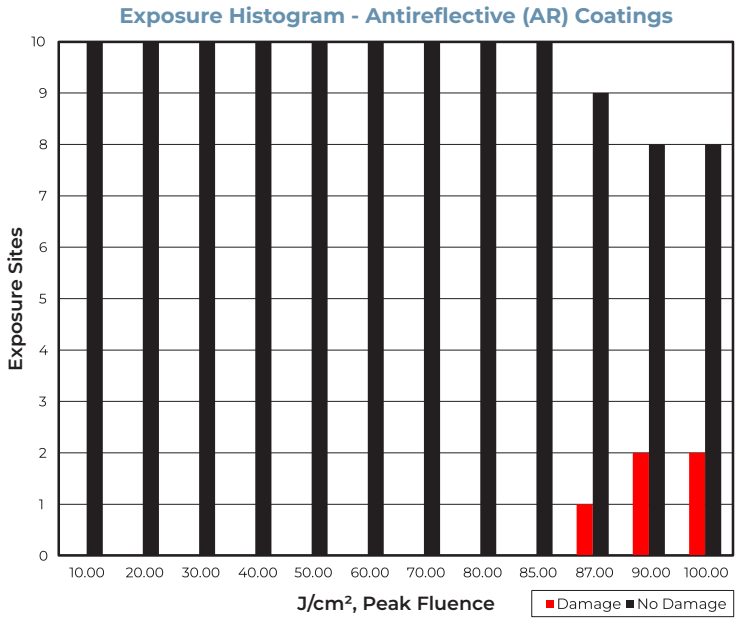
- **Bandwidth control**
- **Visible blocking**
- **Angle-of-incidence (AOI) sensitivity**
- **Thermal stability**
- **Substrate selection**
- **Environmental durability**

High Laser Damage Threshold Coating Performance

Andover's high-LDT coating capability supports demanding laser applications requiring stable optical performance under high fluence conditions. Testing showed an AR-coated optic withstanding 85.00 J/cm² at 1064 nm with 10 ns pulses, with no visible damage across 10 test sites.

Detailed test data is available upon request.

- For demanding high-fluence laser applications
- Helps maintain stable optical performance under challenging conditions
- Applicable to rugged targeting, rangefinding, and alignment systems



SmallSat and Space-Qualified Optics

Solutions for compact satellites and orbital sensing systems

Defense-oriented orbital systems rely on optical components that can withstand launch and space operation within tightly constrained payload architectures.

Filters, coatings, and optical assemblies used in these systems must balance size and weight with thermal stability, vacuum compatibility, low outgassing, and long-term durability.

Space-based defense applications include:

- **Orbital surveillance and monitoring**
- **Earth observation and remote sensing**
- **Multispectral and hyperspectral imaging**
- **Infrared imaging and thermal sensing**
- **Space-based communications**
- **Navigation and mission support**

Space-Qualified Filters and Coatings

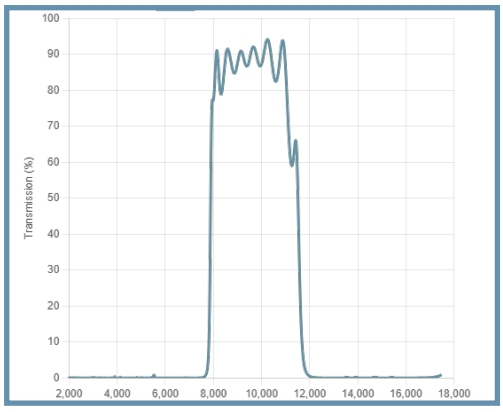
Optical filters and coatings for orbital systems must maintain spectral performance while supporting long-term reliability in compact satellite payloads.

- Temperature-stable coatings and cryogenically-tested components to 77°K
- Low-outgassing and vacuum-compatible designs
- Designed for vibration, shock, radiation, and long-duration orbital exposure

Multispectral and IR Payload Support

Compact satellite payloads rely on optical filters and coatings for multispectral, hyperspectral, and infrared sensing. This includes far-infrared solutions such as N-Band filters for thermal sensing with both cooled and uncooled microbolometer systems.

- IR coating capability in the 3–5 µm and 8–12 µm regions
- N-Band filtering for far-infrared (FIR) thermal sensing
- High transmission with low reflectance in key IR bands
- Strong spectral discrimination for data-rich payloads
- Applicable to cooled and uncooled microbolometer systems



N-Band Filter

SmallSat and Space-Qualified Optics

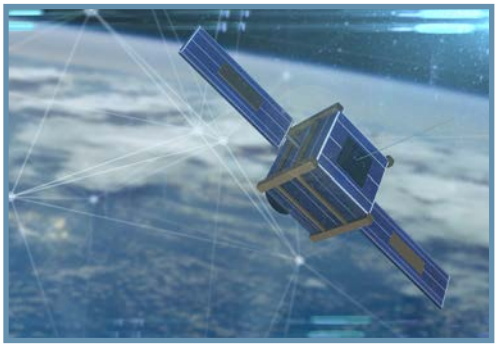
Solutions for compact satellites and orbital sensing systems

Radiation-Hardened Materials and Optical Stability

Material and coating selection play a key role in space-qualified optical performance, affecting transmission, thermal behavior, durability, and long-term stability in orbit. Andover's radiation-hardened materials and matched coating designs support orbital reliability across compact satellite and defense-based space systems.

- Mission-specific material and coating selections
- Helps maintain optical stability under radiation exposure and thermal stress
- Applicable for visible, multispectral, and infrared orbital systems

Space-Constrained Payload Integration



SmallSat and CubeSat payloads often require tightly packaged optical systems within strict size, weight, and power constraints. Filters, coatings, and optical assemblies used in these platforms must support efficient packaging, alignment stability, and sensing performance in orbit.

- Engineered for SWaP-constrained satellite payloads
- Helps balance compact integration with high performance
- Optimized for defense-oriented orbital sensing and mission-support applications

Diamond-Like Carbon Coatings

Advanced durability for infrared optics

Andover Corporation

Diamond-Like Carbon (DLC) coatings combine diamond-like hardness with graphitic properties to provide exceptional durability and abrasion resistance for infrared optics across the 2–14 µm range.

These coatings protect critical IR optics in harsh environments while maintaining strong optical transmission and environmental stability.

DLC coatings are used in applications requiring:

- **Ruggedized infrared optics in abrasive environments**
- **Optical systems exposed to outdoor conditions**
- **Durable first-surface IR components**
- **Long service life and environmental stability**
- **Operation across wide temperature ranges**

DLC coatings are well suited for infrared applications where abrasion, moisture, and harsh environmental exposure can affect optical surfaces. When paired with High-Efficiency Anti-Reflective (HEAR) designs, they can help reduce surface reflection while improving durability.

Commonly applied to infrared substrates such as germanium and silicon, DLC coatings provide first-surface protection that supports both mechanical resilience and optical performance.

Durability is verified through abrasion and windscreen wiper testing, along with sand, salt fog, and humidity exposure to meet or exceed **MIL-C-675C** and **TS188 P5.4.3** standards.

These coatings support infrared optics used in defense, aerospace, environmental monitoring, and industrial applications across wide temperature ranges.

DLC coating on a 12” wafer

A Legacy of Quality Focused on the Future

CELEBRATING 1976 50 2026 YEARS

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