



# Edmund Optics®

## DEFENSE CAPABILITIES



> 20 years successfully  
**Designing, Manufacturing,**  
and **Supplying** fully compliant  
products to the defense industry



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## COTS OPTICAL COMPONENTS

Edmund Optics® offers the world's largest inventory of commercial-off-the-shelf optical components for easy integration into a wide range of applications. These products are fully characterized with design and prescription files that allow quick and easy modeling, as well as functionalized analysis. By partnering with Edmund Optics® at the beginning of the design process, designers of systems serving the defense industry can rapidly produce prototypes and quickly bring products to full rate production.



### COTS WINDOWS

Standard Substrates	Wavelength Range	Coating Options	Standard Sizes
Fluorides: BaF <sub>2</sub> , CaF <sub>2</sub> , MgF <sub>2</sub>	0.120 - 12 μm	Uncoated	5 - 50 mm
Fused Silica	0.2 - 2.2 μm	Uncoated, 5 BBAR & 4 Laser Line Options	5 - 50 mm
Sapphire	0.2 - 5.5 μm	Uncoated & Metalized Edge Options	2.5 - 75 mm
Salts: KBr, NaCl	0.25 - 26 μm	Uncoated	13 - 50 mm
N-BK7 & Visible Glasses	0.35 - 2 μm	Uncoated, 5 BBAR, 7 Laser Line & Hydrophobic Options	5 - 200 mm
Zinc Selenide and Zinc Sulfide	0.4 - 18 μm	Uncoated & 2 BBAR Options	10 - 75 mm
Silicon	1.2 - 7 μm	Uncoated & 1 BBAR Option	10 - 50 mm
Germanium	2 - 14 μm	Uncoated & 3 BBAR Options	10 - 75 mm



### COTS PRISMS

Standard Geometries	Function	Substrates	Standard Sizes
Right Angle, Penta, Amici Roof Prisms	90° Deviation	N-BK7, N-SF11, Fused Silica	0.18 - 75 mm
Half Penta, Schmidt Prisms	45° Deviation	N-BK7	10 - 25 mm
Corner Cube Prisms	Retroreflection	N-BK7, Fused Silica	7.16 - 76.2 mm
Light Pipes, Tapered Light Pipes	Homogenization	N-BK7, Fused Silica	2 - 20 mm
Wedge, Anamorphic, Rhomboid Prisms	Beam Manipulation	N-BK7, N-SF11, Fused Silica	5 - 50 mm
Dove Prisms	Image Rotation	N-BK7	0.5 - 25 mm
Equilateral, Littrow, Ultrafast Prisms	Dispersion	N-BK7, N-SF11, LaKL21, SF10, Fused Silica	5 - 50 mm



### COTS BEAMSPLITTERS

Standard Beamsplitter Types	Wavelength Range	R/T Ratio	Standard Sizes
Plate Beamsplitters	0.25 - 1.1 μm	20/80, 25/75, 30/70, 40/60, 50/50, 60/40, 70/30, 75/25, 80/20	10 - 356 mm
Polarizing Cube Beamsplitters	0.3 - 1.1 μm	Reflect S / Transmit P	5 - 50 mm
Non-Polarizing Plate Beamsplitters	0.35 - 1.064 μm	50/50	12.5 - 50 mm
Dichroic Beamsplitters	0.4 - 0.8 μm	NA	12.5 - 50 mm
Standard Cube Beamsplitters	0.4 - 0.7 μm	30/70, 50/50, 70/30	5 - 50 mm
Polarizing Plate Beamsplitters	0.42 - 0.67 μm	Reflect S / Transmit P	12.5 - 25 mm
Lateral Displacement Beamsplitters	0.43 - 1.08 μm	50/50	10 - 20 mm
Non-Polarizing Cube Beamsplitters	0.43 - 1.62 μm	50/50	5 - 50 mm
Infrared Plate Beamsplitters	2 - 14 μm	50/50	25.4 - 50.8 mm



### COTS LENSES

Standard Lens Types	Focal Length Range	Substrates	Standard Sizes
Achromatic Lenses	1.5 - 1900 mm	Visible Glasses, Fused Silica, Calcium Fluoride, Silicon, Germanium, Zinc Sulfide, Galium Arsenide	1 - 128 mm
Aspheric Lenses	0.7 - 100 mm	Visible Glasses, Fused Silica, Plastic, Silicon, Germanium, Zinc Selenide, IG6	1.8 - 50 mm
DCX Lenses	3 - 500 mm	Visible Glasses, Fused Silica	3 - 50 mm
Negative Achromatic Lenses	-7.5 to -150 mm	Visible Glasses	6.25 - 40 mm
PCV & DCV Lenses	-6 to -250 mm	Visible Glasses, Fused Silica	3 - 50 mm
PCX Lenses	0.6 - 1000 mm	Visible Glasses, Fused Silica, Calcium Fluoride, Silicon, Germanium, Zinc Selenide	1 - 75 mm



## COTS FILTERS & COTS ASSEMBLIES

### COTS FILTERS

Filter Type	Wavelength Range	Optical Densities
Single Substrate Bandpass Filters	0.3 - 2.0 $\mu\text{m}$	$\geq 4, \geq 6$
Traditional Bandpass Filters	0.193 - 10.6 $\mu\text{m}$	$\geq 3, \geq 4$
Notch Filters	0.355 - 1.064 $\mu\text{m}$	$\geq 6$
Longpass Filters	0.266 - 7.3 $\mu\text{m}$	$\geq 2, \geq 4$
Shortpass Filters	0.4 - 1.6 $\mu\text{m}$	$\geq 2, \geq 4$
Dichroic Filters	0.4 - 1.2 $\mu\text{m}$	N/A
Color Glass Filters	0.285 - 1.0 $\mu\text{m}$	N/A
Neutral Density Filters	UV, VIS, NIR, IR	0.1 - 4.0

### COTS ASSEMBLIES

Assembly Type	Features
Imaging Lenses	Fixed Focal Length, Telecentric, Variable Magnification, and Fixed Magnification Designs
Eyepieces	Large Field of View and Eye Relief Optimized for Use with Microdisplays
Night Vision	ENVG Eyepiece and Objective, PVS-14 Eyepiece and Objective
Relay Lenses	Achromatic Pairs, Designs Optimized for 1:1 Imaging
Laser Beam Expanders	Fixed Power and Variable Versions Designed for UV, Visible, and IR Lasers
Reflective Objectives	Magnifications Ranging from 15X - 74X with Aluminum or Gold Coatings



## COMPONENT DESIGN AND MANUFACTURING EXPERTISE

- I<sup>2</sup>, NIR, SWIR, and MID-IR Objectives
- Beam Combiner, Image Blending, and Fusion Optics
- Range Finder Collimators and Windows, Retroreflectors, and Wedge Prisms
- Laser Designators
- Reticule Prisms
- EMI Shielding
- Beam Shaping Optics

“EO Lenses perform much better than our current supplier’s – they also delivered quickly.”

– Leading US government contractor



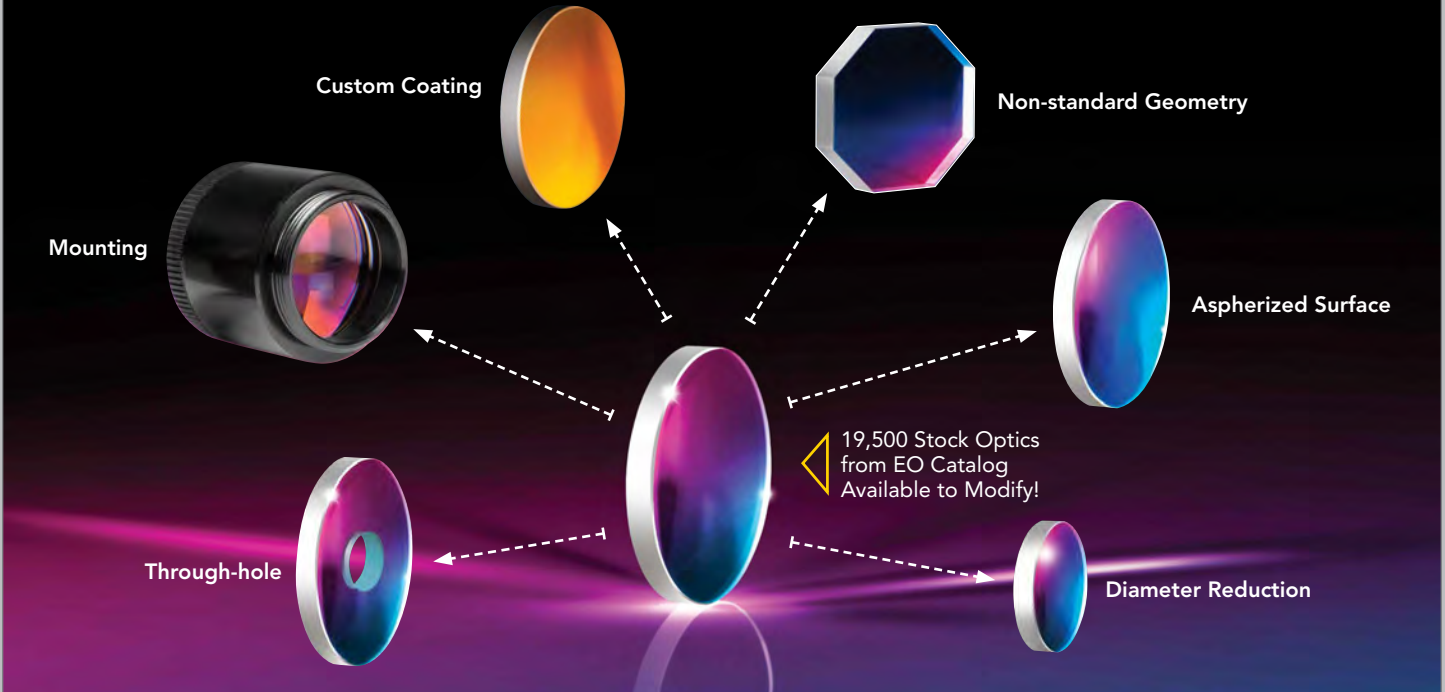
Photograph courtesy of  
Cpl. Matt Tippin





# MODIFY COTS OPTICS

## EXAMPLE: ONE STOCK OPTIC = INFINITE POSSIBILITIES



- ☐ Customized in 2 - 3 Weeks, Many Within 10 Days
- ☐ 19,500 Stock Optics Available for Quick Modification
- ☐ From Concept to Design to Prototype to Volume Production - We Make it Easy!

MODIFICATION SERVICES OFFERED							
	Lenses	Mirrors	Windows	Filters	Polarizers	Beamsplitters	Prisms
Coating	✓	✓	✓	✓	✓	✓	✓
Diameter Reduction	✓	✓	✓	✓	✓	✓	✓
Linear Cut to Size	✓	✓	✓	✓	✓	✓	✓
Sorting or Inspection	✓	✓	✓	✓	✓	✓	✓
Mounting, Kitting, or Serialization	✓	✓	✓	✓	✓	✓	✓
Through-hole	✓	✓	✓	✓	✓	✓	✓
Engraving	✓	✓	✓	✓	✓	✓	✓
Edge Blackening	✓		✓	✓		✓	✓
Core Drilling	✓	✓	✓	✓	✓	✓	
Surface Improvement	✓		✓				✓
Sphere to Asphere	✓						



Chris Cook  
Principal Coating  
Engineer and  
Veteran

Edmund Optics, Inc. **EMPLOYS VETERANS.**



## OPTICAL DESIGN EXPERTISE

### EDMUND OPTICS DESIGN TEAM

- Optical, Optomechanical, and Manufacturing Engineers Experienced in Design for Manufacturability
- UV, Visible, NIR, SWIR, MID-IR, and Thermal Designs

Zemax

CODE V

FRED  
Optimum

3D  
SolidWorks



Randall Hinton  
Solutions Engineer  
Team Defense



## FEATURED DESIGN

- Compact COTS Microdisplay Eyepiece
- Compatible with up to 24 mm Diagonal Microdisplay (SXGA)
- Design and Housing can be Modified to Fit Application

#### TECHSPEC® HIGH PERFORMANCE MICRODISPLAY EYEPIECE

Effective Focal Length	33 mm
Eye Relief	25 mm
Eye Box Design	12 mm
Field of View (Diagonal)	40°
Max Display Size	24.59 mm Diagonal (SXGA)
Distortion (centered 3 mm pupil)	<3%
Distortion (Eye Box)	<5%
Transmission (avg)	90%
Mounting Thread	M39 x 1.0
Weight	112 g
Stock No.	#87-311



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Contact Us to Discuss Your Project!

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## PRECISION MANUFACTURING CAPABILITIES

### OPTICAL COATINGS



- Hydrophobic Coatings
- EMI / ITO Coatings
- Infrared Coatings (SWIR, Thermal)
- Thermal Resistant Filters
- Multi-Layer Dielectrics
- Dichroic Filters
- Beam Combiners (Polarizing and Non-Polarizing)
- Narrowband and Broadband Interference Filters
- Hot and Cold Dielectric Mirrors
- High Laser Damage Threshold Coatings
- Transparent Conductive Coatings
- Anti-Reflection Coatings
- Laser Mirrors
- Metallic Mirrors
- Neutral Density Filters
- Fluorescence Filters
- Notch (Minus) Filters
- High Performance Edge Filters (LWP and SWP Filters)

#### Specialized Custom Designs

### MANUFACTURING CAPABILITIES

OPTICAL COMPONENT SPECIFICATIONS	Plano	Prism	Sphere Radius	Asphere Radius	Cylindrical
Diameter (mm)	3 - 500	2 - 150	1 - 200	10 - 150	15 - 120
Length (mm)	2 - 350	2 - 105	2 - 140	—	10.5 - 85
Width (mm)	2 - 350	2 - 105	2 - 140	—	10.5 - 85
Dimensional Tolerances (mm)	0.010	0.05	0.010	0.010	0.010
Center Thickness Tolerance (mm)	0.010	—	0.010	0.010	0.010
Parallelism Tolerance (arcsec)	5	—	—	—	30
Wedge Tolerance (mm)	0.005	—	0.005	0.025	—
Surface Accuracy	$\lambda/20$	$\lambda/20$	$\lambda/20$	$\lambda/10$	$\lambda/20$
Surface Quality	10-5	10-5	10-5	10-5	10-5
Angle Accuracy (arcsec)	—	1	—	—	—
Pyramidal Accuracy (arcsec)	—	5	—	—	—
Concave	—	—	>5.0	>30.0	>10.0
Convex	—	—	>2.5	>5.0	>5.0
Radius Tolerance (%)	—	—	0.05	0.05	0.1
Total Sag (mm)	—	—	—	<25	—

FILTER COATING CAPABILITIES	
Dimensions (Dia. or Sq., mm)	2 - 1000
Substrates	All Glass Types
Spectral Ranges ( $\mu\text{m}$ )	0.193 - 14
Edge Steepness ( $T_{50\%}$ to OD>4, %)	<0.5
Spectral Edge Tolerance (%)	<1 Deviation, <0.2 Special Cases
Blocking	>OD 7, Measured
Neutral Density Tolerance (%)	OD $\pm 5$
CWL (nm)	$\pm 1$
Bandwidth (nm)	1 - Broadband
Transmission (%)	>95, Typical
Reflection (%)	0.1 - 99.95
Polarization (S:P)	10,000:1
Laser Damage Threshold	Up to 20 J/cm <sup>2</sup> @ 20 ns Pulses
Durability	MIL-STD-810F, Section 507.4, MIL-C-48497A, Section 3.4.1



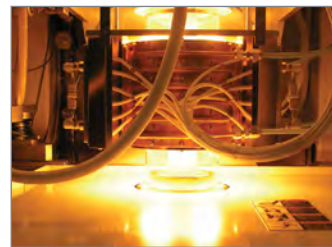
DESIGN TO PROTOTYPE TO VOLUME PRODUCTION.

## IR MOLDING CAPABILITIES

- Ideally Suited for Volume Defense, Life Sciences, and Industrial Applications
- High Precision Molding of Nontraditional Materials to Support OEM Production at a Competitive Price
- Key Applications: Thermal Imaging, Thermal Weapon Sight, Vehicle Vision Enhancement, Long Range Surveillance, and Thermography



Thermal Imaging



IR Molding



## QUALITY AND METROLOGY CAPABILITIES



QED® ASI™ Aspheric Stitching Interferometer



Nikon® Autocollimator

### QUALITY STANDARDS

- ☐ ISO 9001:2008
- ☐ ANSI / ASME Y14.5
- ☐ ISO 10110
- ☐ MIL-C-48497A
- ☐ MIL-STD-810
- ☐ MIL-PRF-13830B
- ☐ Fully ITAR Compliant Factories

### METROLOGY

- ☐ State-of-the-Art Optical Metrology
- ☐ Automated Equipment for Optical Parameters such as EFL, Distortion, Field Curvature, and Concentricity
- ☐ Radiometrics: Straylight, Veiling Glare, etc.
- ☐ Semi-Automated MTF Measurement Equipment
- ☐ Environmental Testing Equipment such as Vibration, Humidity, and Immersion



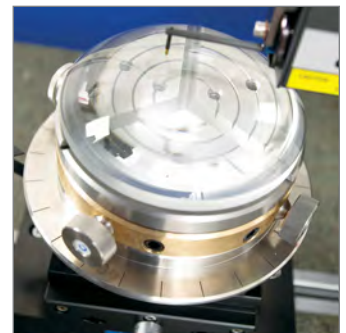
Full On-site  
Inspection



Varian  
Spectrophotometer



Zygo® NewView™



Taylor Hobson®  
Profilometer



Edmund Optics, Inc. is a **WOMAN OWNED COMPANY.**



# What Can We MAKE FOR YOU?



LENSES

PRISMS

FILTERS

ASPHERES

COATINGS

ASSEMBLIES

## TECHSPEC® IG6 IR ASPHERIC LENSES

- Diffraction Limited Performance
- Ideal for IR Lasers, Thermal Imaging, or FTIR Spectroscopy
- Higher Uncoated Transmission than Germanium



## TECHSPEC® HARSH ENVIRONMENT μ-VIDEO IMAGING LENSES

- Designed for Infinite Conjugate Systems
- Weatherproofed Housing
- Optimized for 1/8" and 1/2" CCD Sensors

## TECHSPEC® SILICON ASPHERIC LENSES

- Diffraction Limited Performance
- Low Density and Dispersion
- Ideal for Weight Sensitive IR Applications



## TECHSPEC® SWIR FIXED FOCAL LENGTH IMAGING LENSES

- Designed, Coated, and Tested for SWIR Wavelengths
- Compact, Lightweight, COTS Imaging Lenses
- Low f/# for High Throughput

Contact Us to Discuss Your Project!

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