



GOVERNMENT & DEFENSE



OPTICAL COMPONENTS & SOLUTIONS

PRECISION OPTICS: COMMERCIAL - INDUSTRIAL - DEFENSE





SUPERIOR OPTICS, SUPERIOR SOLUTIONS

FLIR Precision Optics is a premier provider of high-quality precision optics, serving the commercial, industrial, and defense markets for more than thirty years.

Our focus on quality has earned us a reputation as a world-class manufacturer of precision optical products and solutions supporting a wide array of market applications. Our turnkey solutions make it easier for our customers to get custom optics and components for their unique needs.



OPTICAL FABRICATION

Highly skilled opticians, state-of-the-art computer numerical control (CNC) equipment, and deterministic processes make up the core foundation of our conventional and CNC polishing areas. This philosophy of dual competencies provides the capability and flexibility to address the most complex challenges.

SUBSTRATES

All glass types, Silicon, Germanium, Zinc Selenide, Zinc Sulfide, Calcium Fluoride, Chalcogenide Glasses and others

SPHERICAL, PLANO (5MM – 250MM DIAMETERS)

ASPHERES (5MM - 250MM DIAMETERS)

CUSTOM MACHINING

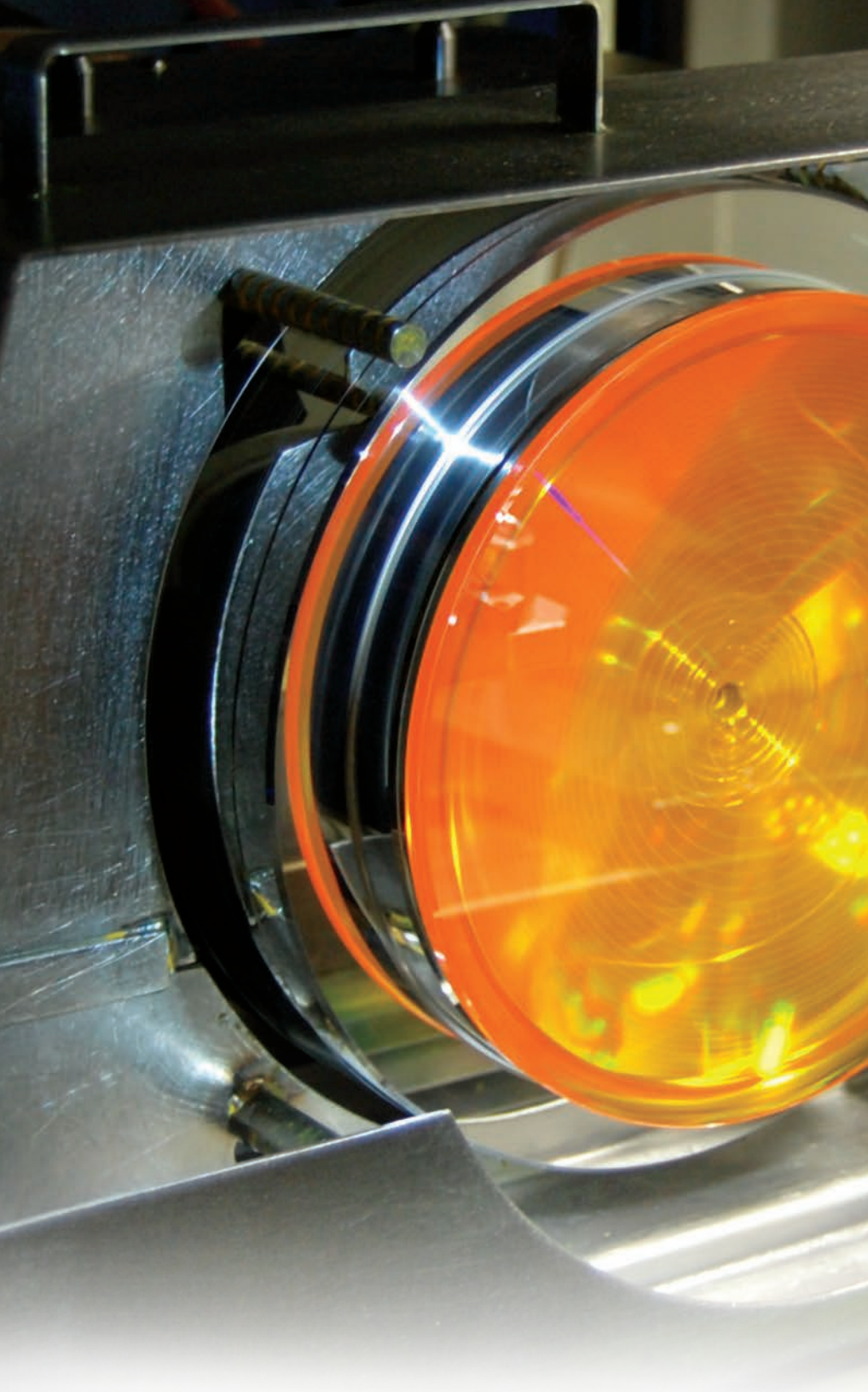
Holes, step cuts, truncations, and freeform profiles

CONVENTIONAL POLISHING AREA

Single/multiple spindles
Double side polishing (DSP)
Continuous polishing (CP)

CNC MACHINING/POLISHING

CNC spherical grinding and polishing machines
CNC asphere grinding and polishing machines
5-axis machining center with ultrasonic capability
Magneto Rheological Finishing (MRF) for ultra-high accuracy surfaces



DIAMOND TURNING

Ultra-high precision CNC lathe platforms, using natural and synthetic diamond cutting tools, allow FLIR Precision Optics to produce complex surface figures that are difficult to accomplish using other classical techniques.

We process a wide variety of materials, including: Zinc Selenide, Zinc Sulfide, Silicon, Germanium, Calcium Fluoride, and non-ferrous metals.

VARIOUS GEOMETRIES

Aspheric, Parabolic, Toroidal, Ellipsoidal and select free-forms

PRECISION LENS ARRAYS

DIFFRACTIVE OPTICAL SURFACES

B-AXIS CONFIGURED FOR STEEP SURFACES

SLOW TOOL SERVO

FAST TOOL SERVO



THIN FILM COATINGS

FLIR engineers can assist in the development and production of customized coating solutions to meet precise optical specifications.

Thin film coating capabilities include ion-assist and advanced plasma source for low temperature depositions, enabling coatings with enhanced density and durability against severe environmental exposure.

Quartz crystal and optical monitoring allows for in-situ film deposition monitoring and precise layer thickness control. Our in-house machines can fabricate any necessary tooling for prototype or production quantities. FLIR produces high-durability anti-reflective (AR) coatings to withstand the harshest marine salt/fog environments.

- ▲ AR, 0.35- 14 microns
- ▲ BBAR
- ▲ Laser Line V coats
- ▲ Mirrors – metal and optical substrates
- ▲ Visible and IR filters
- ▲ DLC for extreme durability requirements
- ▲ ITO for EMI applications
- ▲ Solderable metal coatings
- ▲ Ion-assisted e-beam deposition



INFRARED COATINGS

We design custom IR coatings to meet precise optical requirements on a variety of substrates, including Germanium, Silicon, Zinc Selenide, Zinc Sulfide, Silicon Carbide, Gallium Arsenide, Sapphire, Calcium Fluoride, and Chalcogenide materials. With FLIR technical expertise, we can assist in the development and production of AR, bandpass filters, notch filters, and EOCCM designs using industry-leading DLC (diamond like hard-carbon) coating for applications requiring extreme durability. Our proprietary solderable metalized edge coating technology is designed for hermetic sealing applications.

VISIBLE COATINGS

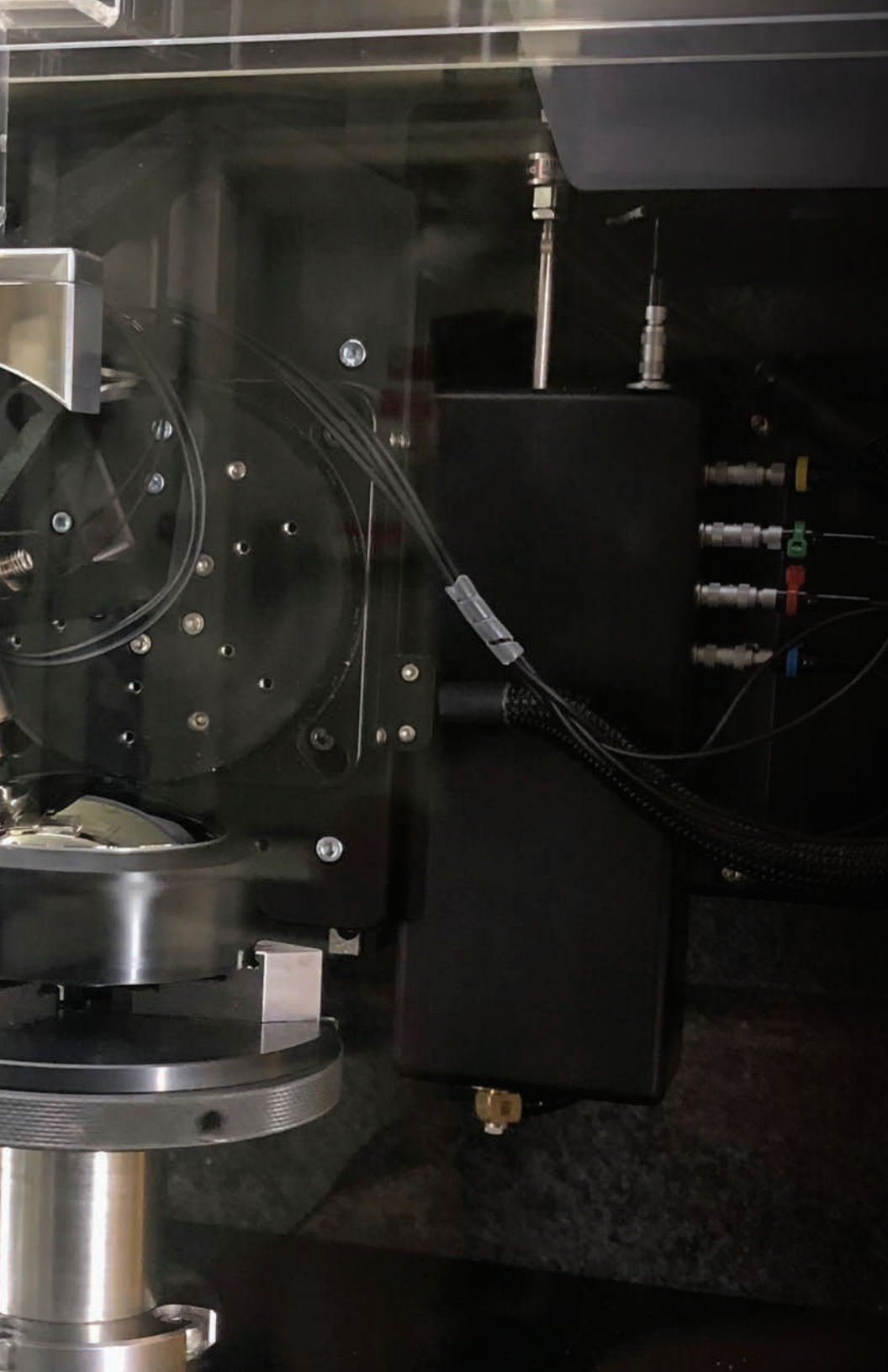
With a variety of custom-tooled vacuum systems to meet a myriad of customer coating requirements, we can assist in the development and production of laser coatings, BBAR, AR, bandpass filters, notch filters, and ITO coatings. State-of-the-art software, coupled with advanced coating techniques allows us to develop a coating that meets your exact spectral and durability requirements.



ADVANCED METROLOGY

With a constantly growing line of advanced metrology equipment, FLIR manufactures components with required precision and accuracy and provides the appropriate data for validation. Our commitment to quality shows in our continuous investment in the best metrology available.





FORM ERROR MEASUREMENT

- Various ZYGO interferometers
- Interferometric scanning metrology system - LumphoScan 260
- Sub-aperture stitching interferometer- QED SS1a
- 2D surface profilometer-Taylor Hobson Form Talysurf PGI 1240

SURFACE CHARACTERIZATION/ANALYSIS

- Non-contact optical profiler- ZYGO ZeGage Plus
- White light interferometer-Taylor Hobson CCI
- Zeiss AXIO microscope with light, dark, and Nomarski illumination

PROFILE MEASUREMENT

- Multi-sensor Coordinate Measuring Machine (CMM)
- Non-contact- OGP Smartscope Flash 302

SPECTROPHOTOMETERS

- UV/VIS/NIR- Perkin Elmer Lambda 1050
- UV/VIS/NIR- Perkin Elmer Lambda 950
- Infrared- Perkin Elmer Frontier Optica FTIR

OPTICAL/MECHANICAL ASSEMBLIES AND SUB-ASSEMBLIES

FLIR Precision Optics produces rugged, MIL-SPEC qualified and performance-documented optical assemblies and sub-assemblies utilizing 20+ years of experience and consistent quality. Our assemblies and sub-assemblies are used in weapon sights, handheld devices, airborne and ground imaging systems, and high-end scientific camera systems throughout the world. With over 100,000 lens assemblies fielded, FLIR Optics has a solid record of success with various end-use military, commercial, and scientific products and applications.



MWIR, LWIR, SWIR AND VISIBLE LENS ASSEMBLIES AND SUB-ASSEMBLIES

- Fixed focus, manual focus, motorized focus, auto focus
- Zoom
- Telecentric
- Microscope
- Camera-controlled
- Broadband (SWIR-MWIR, VISNIR-LWIR)
- Objective
- Eyepiece

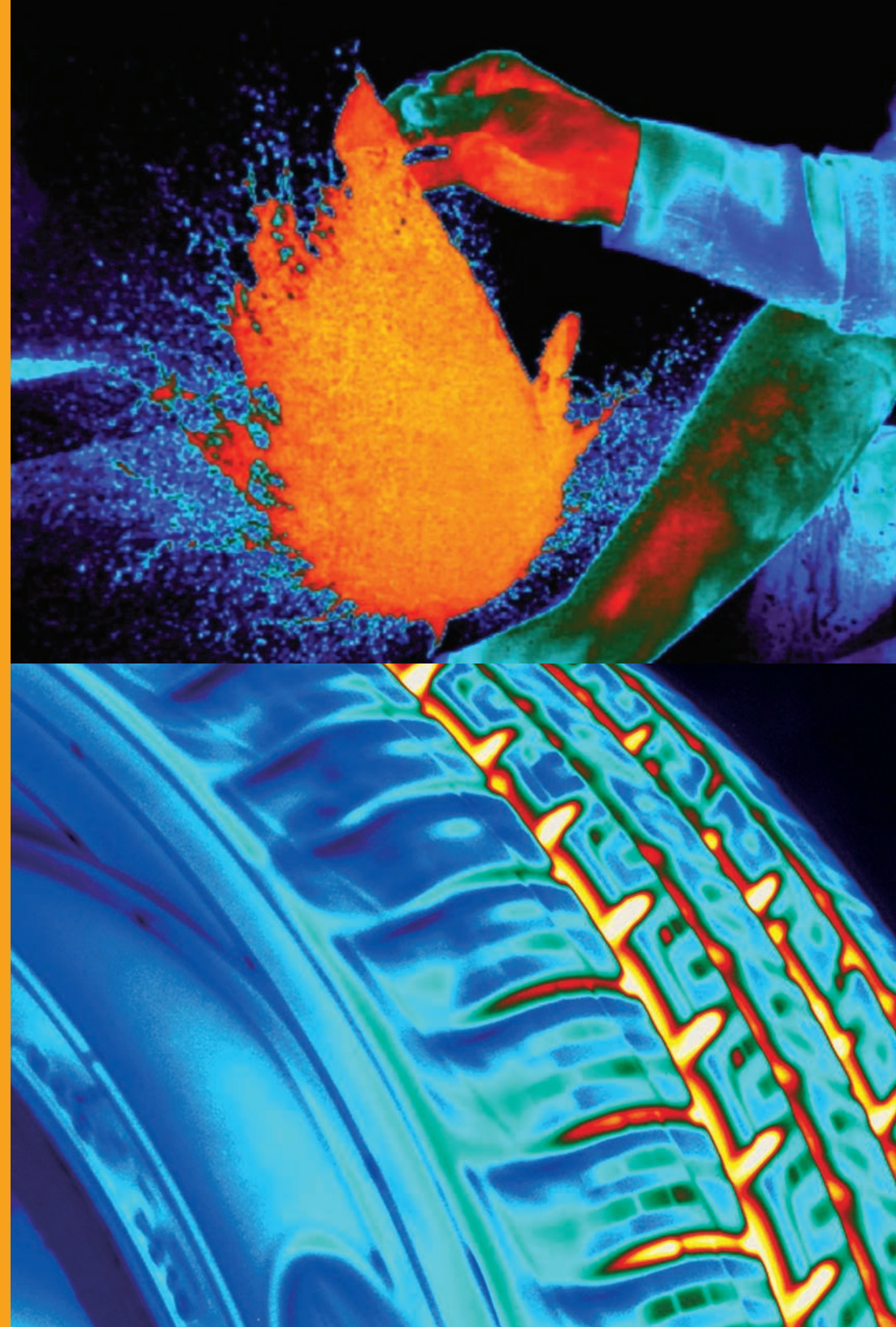
Having the ability to complete all MIL-SPEC testing, including live-fire weapon shock, simulated shock, and all required versions of leak proof testing, within one location provides customers with unique advantages to confidently streamline product development.

MIL-SPEC QUALIFICATIONS

- Weapon-shock
- Environmental thermal cycle, -55°C to +125°C
- Leak testing, air, water and helium

TESTING AND METROLOGY EQUIPMENT

- IR and visible MTF systems
- IR and visible alignment stations
- Contact and non-contact CMM systems
- Automated and programmable shock simulators
- Automated and programmable environmental chambers
- Environmental and humidity chamber
- Salt fog chamber

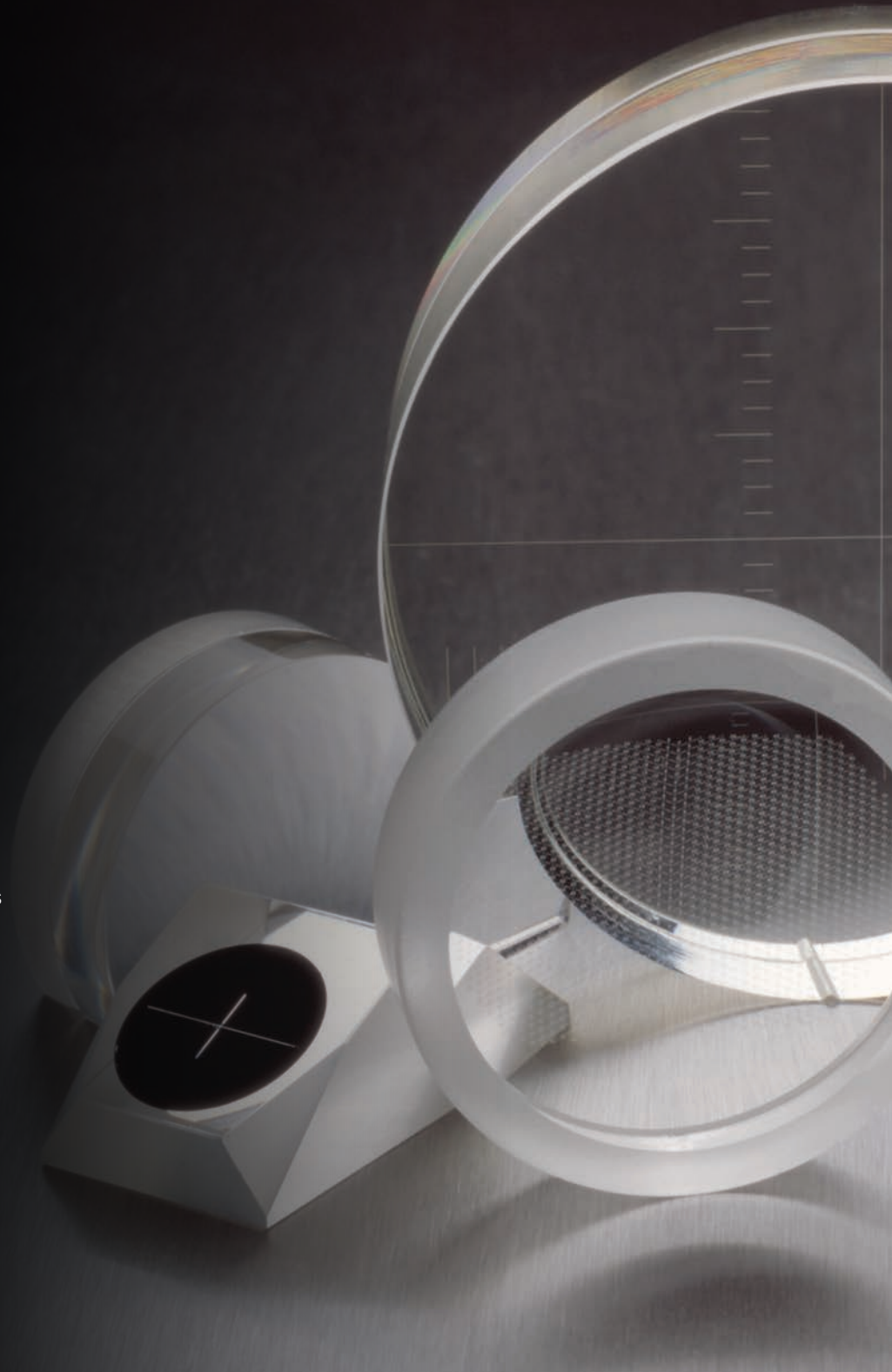


RETICLES

FLIR Precision Optics is the largest volume U.S. manufacturer of precision reticles for both military and sport optics and have been fielded on more than one million riflescopes.

Photolithography creates precision patterns with linewidths as fine as 3 microns. Add in windage and range subtension divisions and our complex reticles meet exacting standards of high-resolution, long-range target applications, both on the battlefield and the shooting range.

Starting with customer input and requirements, FLIR engineers work collaboratively to ensure the reticle patterns provide the user with the information needed for their application. Our reticles provide sharp demarcations, high contrast, uniform illumination, and high-quality AR coatings on a wide variety of substrates, including prisms and powered doublets.





ILLUMINATED RETICLES

- Etch & fill
- Complex patterns
- 4-micron linewidths for high magnification applications
- High Visibility Technology (patent pending) patterns available

NON-ILLUMINATED RETICLES

- 3-micron lines for the highest magnification requirements
- Low-reflection patterning
- Low-contrast patterns, if desired (e.g., binocular, spotting scopes, etc.)

HIGH VISIBILITY TECHNOLOGY PATTERNS

- Provide high-contrast reticle information against any background
- No need to change illumination settings
- Superior scan-and-fire performance



PATTERNED OPTICS

Patterned optics are windows with technical patterns. These patterns either convey information or perform a function, such as electro-magnetic interference (EMI) attenuation or window heating; or they provide a brazing surface for hermetic sealing – all on precision optical components.

Gridded windows for EMI suppression can be designed to allow certain frequencies to pass or attenuate across the designated frequency spectrum. Heating grids can broadly heat the window or focus heat in an engineered pattern.

APPLICATIONS/FEATURES

GRIDDED WINDOWS FOR EMI ATTENUATION

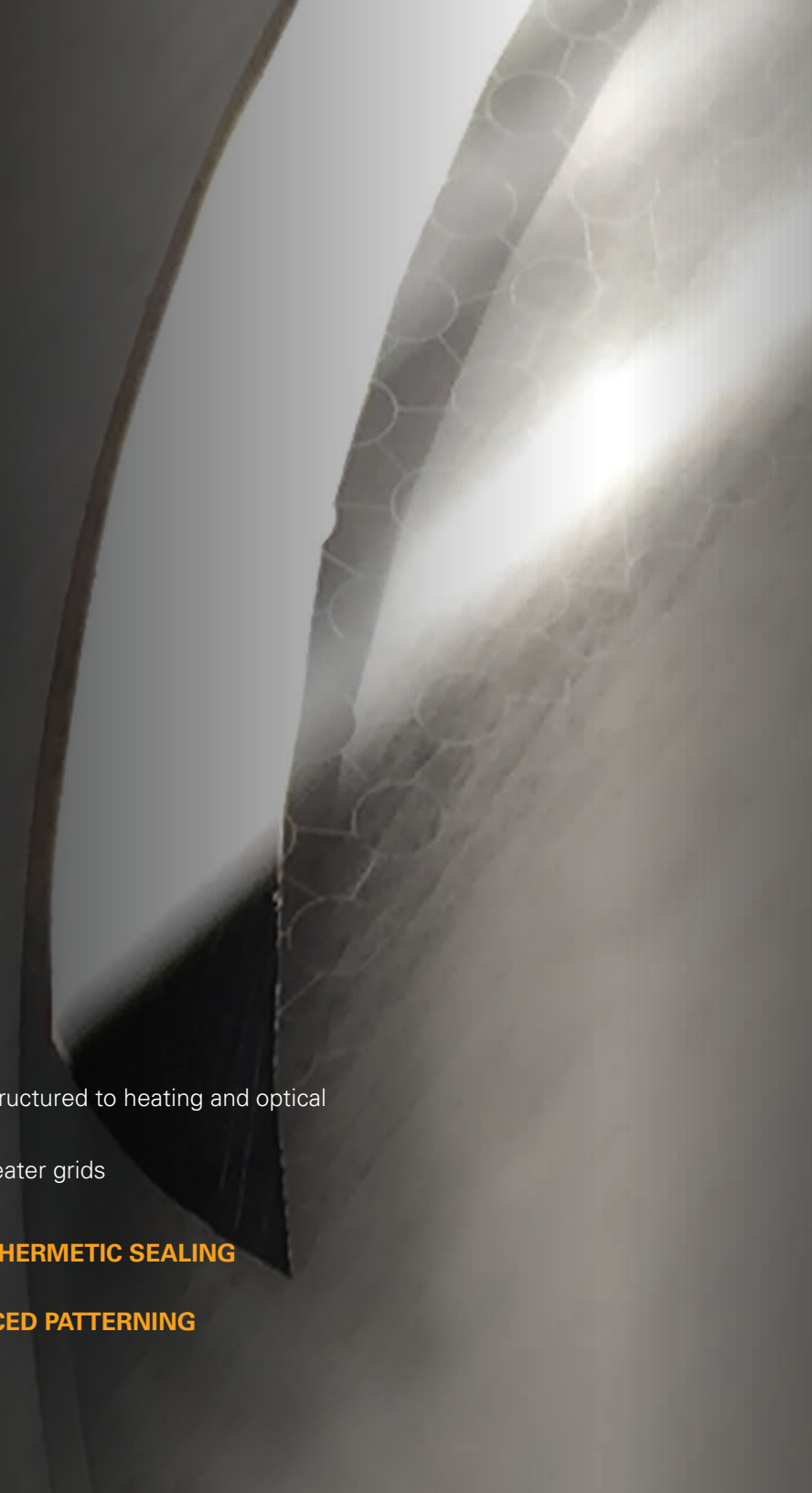
- Fine lines – for high transmission
- BBAR coatings on VIS and IR substrates
- EMI attenuation – across frequency range of 1 MHz to 40 GHz
- Reduced diffraction effects

HEATER APPLICATIONS

- Custom patterning, structured to heating and optical requirements
- Combined EMI and heater grids

METALIZED EDGES FOR HERMETIC SEALING

ALIGNED MULTI-SURFACED PATTERNING



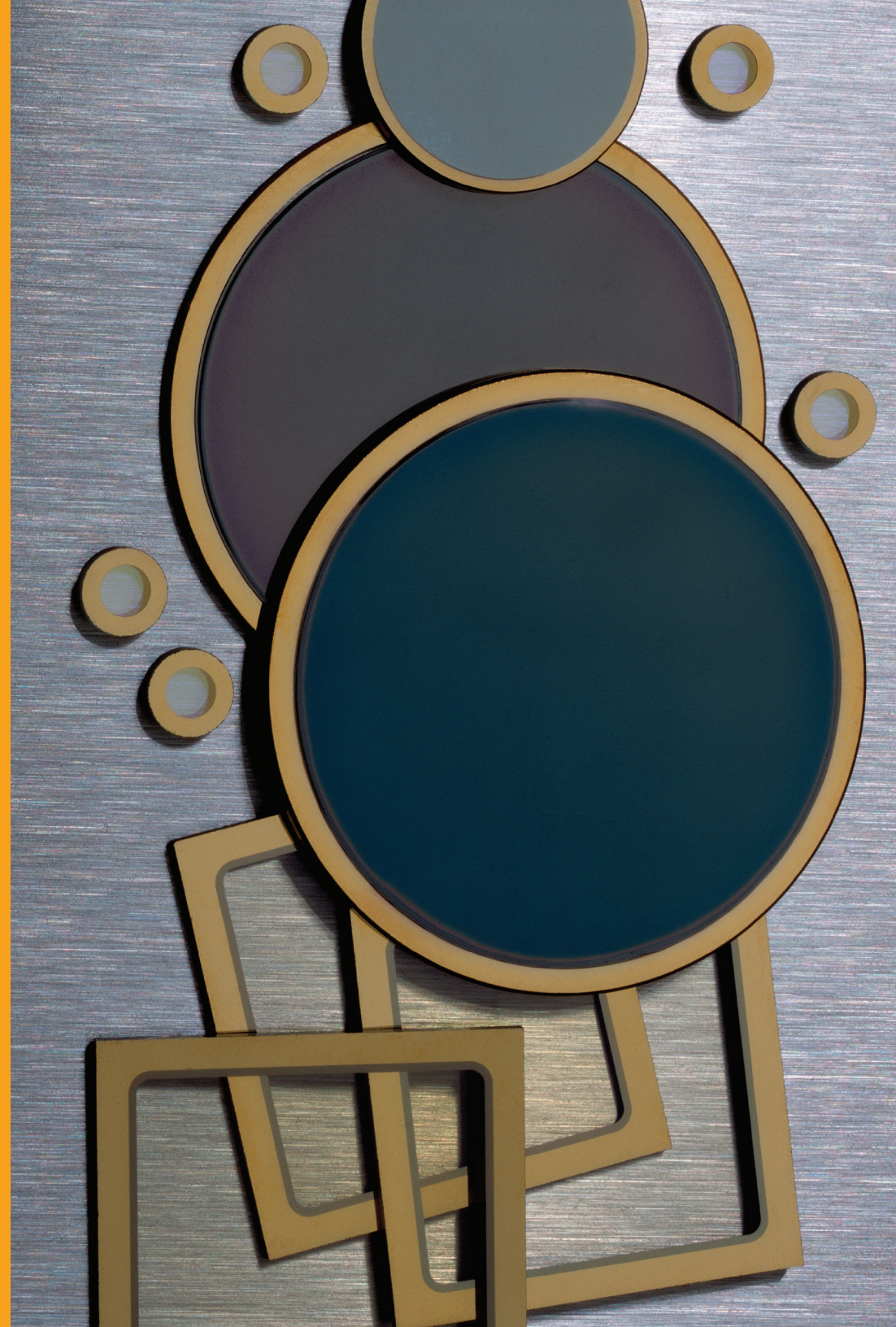
QUALITY ASSURANCE

FLIR AS9100D and ISO9001:2015 certified Management Systems provide a recognized commitment to best practices through independent auditing. We're building more than innovative technologies; we're creating a more sustainable, more efficient, and safer future by enhancing human perception through best-in-class intelligent imaging and sensing solutions of the highest level of quality.

COMPLIANCE

FLIR Systems, Inc. is registered with the Directorate of Defense Trade Controls (DDTC) and compliant with International Traffic in Arms Regulations (ITAR).

As The World's Sixth Sense, we take our task and purpose of saving lives and livelihoods very seriously. We are proud of our continuous diligence in safeguarding controlled products, services, and information that allow our military and its allies to excel with our solutions.





STAR SAFIRE 380-HD

Our optics are vertically integrated in FLIR products and range in size from the Black Hornet nano-UAV to handheld sights to large gimbals for airborne, maritime, and land applications.



RECON V ULTRA LITE



BLACK HORNET PERSONAL RECONNAISSANCE SYSTEM

APPLICATION: FORCE PROTECTION

FLIR Systems, Inc. is an established global leader in the design, manufacture, and support of electro-optic and IR sensor technology. Recognized as a principal supplier for force protection and military base/border security around the world, FLIR is the worldwide leader in the production of IR detectors and sensors.

FLIR has provided over 100,000 military, dual-use, and commercial IR sensors for airborne, maritime, land, and vehicle platforms for customers in more than 75 nations. Since 1997, FLIR Precision Optics has provided optics for thousands of uncooled and cooled cameras and systems to help secure and protect air and naval facilities, combat and peacekeeping forces, borders, and critical infrastructure. Day and night, the soldiers, Marines, sailors and airmen of the U.S., NATO, and allied nations live and work under the security umbrella provided by FLIR. Around the world, base defense operations and other security staff are familiar with the quality, reliability, and performance of our sensors, systems, and optics.

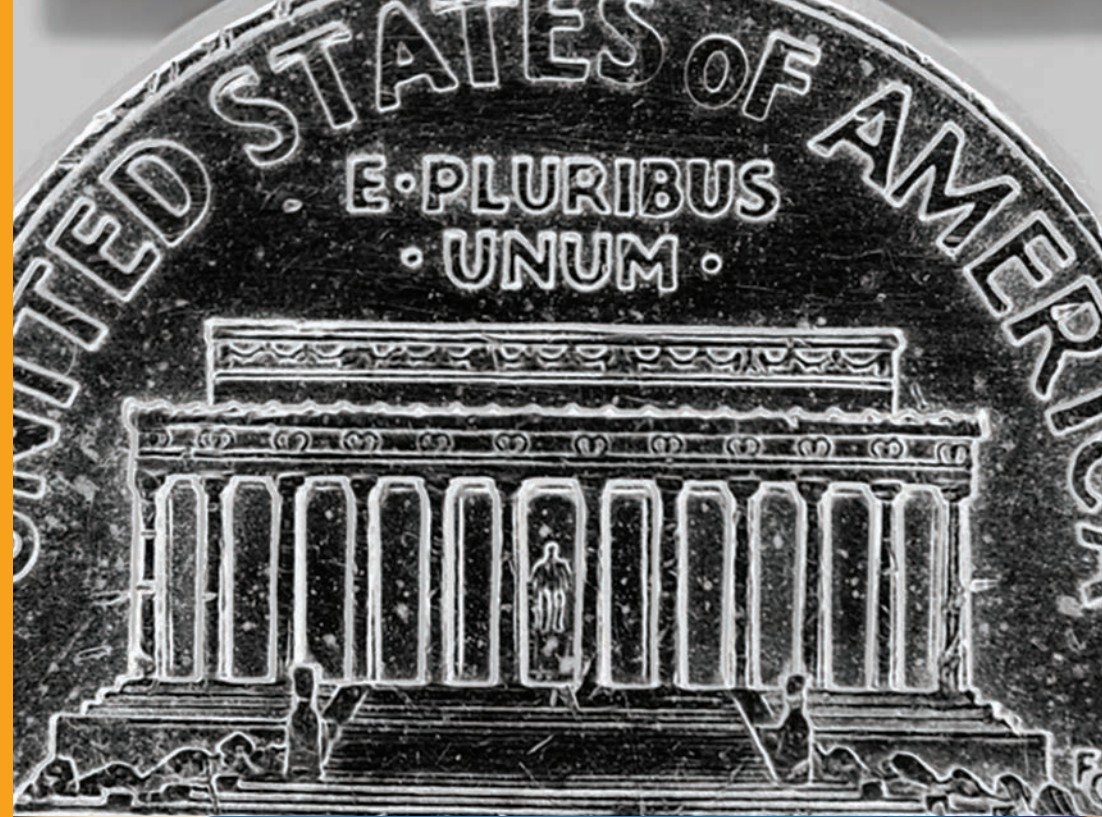
The background of the entire page is a close-up, artistic photograph of numerous blue-tinted optical lenses or components. These components are arranged in a grid-like pattern, with some in sharp focus and others blurred in the foreground and background, creating a sense of depth and technical precision. The lighting is soft, highlighting the curved surfaces and the reflective properties of the lenses.

OUR CUSTOMERS ARE OUR CREDENTIALS

FLIR has earned a reputation for rapid and responsive service as a result of our customer focus. Lasers, optics, coolers, detectors, and other components are all made in-house. There is only one link in your supply chain, and that's FLIR.

NEXT STEPS

To learn how you can engage with FLIR as your preferred solution provider and advisor for optical components, patterned optics, and optical assemblies, please visit www.FLIR.com or contact us at optics@flir.com.



AT HOME AND AROUND THE WORLD

**Our commitment to service and support:
Ensuring mission success now and into the future.**



● FLIR Precision Optics

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The World's **Sixth Sense**®

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