

OPTICAL PRODUCTS



KRUGER OPTICAL
U.S. ENGINEERED FOR INNOVATION & VALUE

PRECISION OPTICS



Projection lens

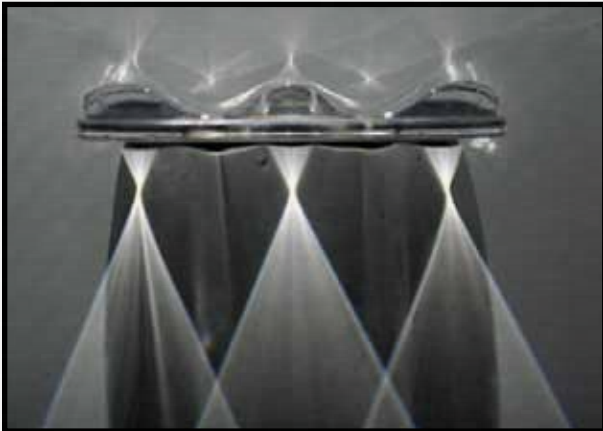
Kruger Optical, Inc. supplies precision optical components, subassemblies and finished goods to consumers worldwide. We offer customers the best of both worlds: U.S.-based service and technical expertise, together with factory-direct Asian pricing. Our factory is known for its ability to produce difficult parts in large volume.



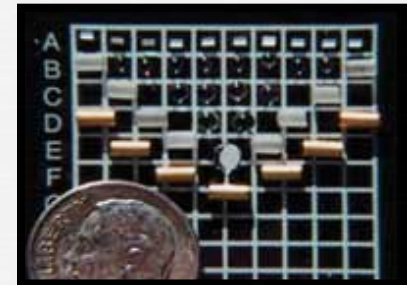
QA inspection in U.S. facility

Sourcing, design, manufacturing

- High-capacity, ISO 9001-certified factory
- Outstanding service from U.S.-based English-speaking sales engineers
- Custom-design services by U.S. engineers
- Products include **precision molded lenses**, prisms, beamsplitters, molded optics, windows, microlenses, prism and lens assemblies, opto-mechanical assemblies
- **Precision coatings:** multilayer, polarization, dichroic filters, beamsplitters, dichroic and metal mirrors
- Finished goods: binoculars, telescopic sights, spotting scopes, and more
- Quality Assurance at each production step
- **U.S. assembly and prototype/QA lab**



Molded cylinder lenses



Telecommunication lenses

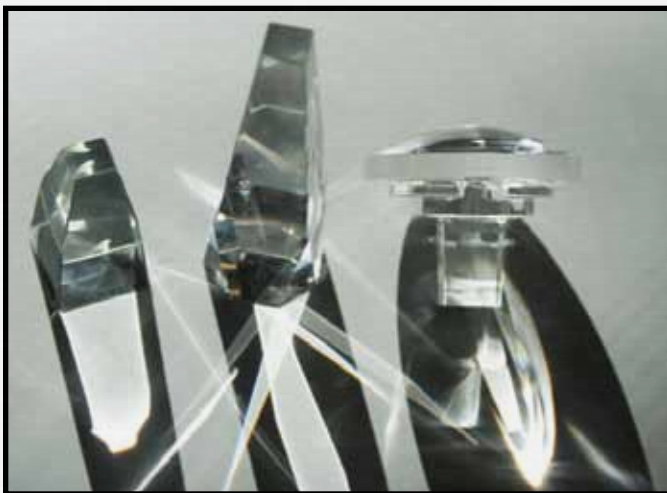
Precision molded optics

We manufacture high-volume, precision molded optics in our specialized factory in Asia. Using newly developed molding technology, we can mass-produce complicated, non-standard optical elements for a variety of applications, including automotive, solar, medical, lighting and LED.

We are able to combine multiple lenses into complex elements and shapes that cannot be achieved through conventional means. Kruger's experienced optical engineers can work with customers to acquire or develop elements for their specific applications.



Molded optics assortment



Molded light pipes

Products include:

- Fresnel lenses
- Cylinder lenses
- Light pipes
- Aspheric lenses
- Spherical lenses
- Prisms
- Flats
- Mirrors



Molded Fresnel cylinder lens

Subassemblies



Optical subassemblies

Kruger supplies optical subassemblies for a variety of industries. In our ISO 9001-certified factory, we produce subassemblies ranging from simple to highly complex. We also offer U.S. assembled product from our U.S. assembly and prototype facility. We are particularly renowned for our projection optics, and we produce subassemblies for the CCD, sport optics and camera optics markets, among others.

Products include:

- Multi-element lenses
- Prism assemblies
- Metal and plastic housing
- Zoom lens assemblies
- Telephoto lenses
- Aspheric subassemblies
- Rear projection and front projection optical engines
- Multi-elements lens systems for LCOS, DLP and LCD projection subassemblies
- CCD camera lens assemblies
- Microscope elements and eyepieces



Optical projection engine

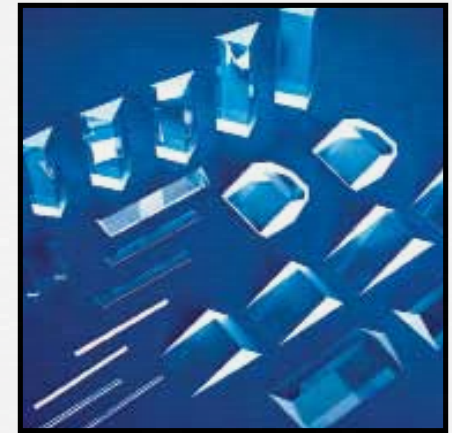
Lenses, prisms and flats



Full spectrum of lenses available



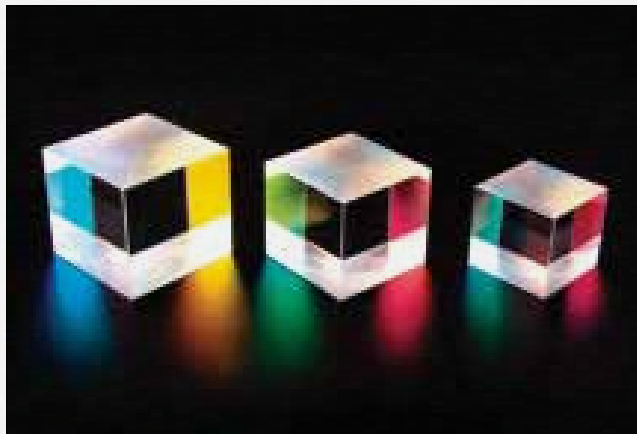
Optical component processing



Wide range of prisms available

We produce lenses, prisms and flats of all sizes and types in our 9001- and 9002-certified factories. We offer lenses - both simple and complex - in large or small volumes. We offer a full spectrum of prisms and prism subassemblies, from very small (less than 1 mm) to very large 6" 1-second master processing blocks.

We manufacture all our own tools and equipment. In our precision prototype shop, we manufacture our own test plates with irregularity of less than $\lambda/20$. We utilize a full set of process Quality Assurance equipment, including on-line interferometers, resulting in very high surface quality and accuracy.



X-cube beam splitter

Lens offerings include:

- Singlets, doublets, triplets
- Meniscus, convex, concave
- Aspheric
- Ball & rod lenses
- Molded lenses
- Cylinder lenses (including parabolic)
- Microlenses
- Large lenses, diameter >6 inches
- Multi-element lenses: zoom, telecentric, CCD, CCTV, scopes, microscope, telephoto

Prism offerings include:

- Aspheric molded lightpipes
- Porro
- Roof
- Right angle
- Penta
- Beamsplitter
- Flats
- Windows

Coatings



Kruger offers a full range of precision coatings

Kruger's ISO 9001 certified factory can produce just about every coating required today, including the most difficult. Our high-capacity factory is equipped with coating chambers and large, multi-layer coating chambers, many equipped with ion-assist guns. We also employ automated ultrasonic cleaning stations, as well as spectrophotometers to guarantee coating performance.

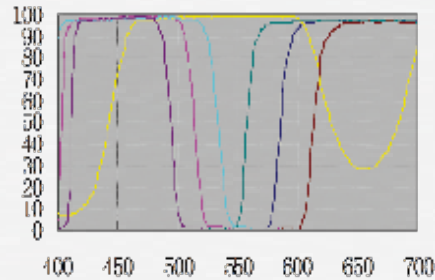
Coating offerings include:

- Multi-layer
- High performance BBAR
- Polarization
- Narrow band dichroic notch
- Hydrophobic
- Near IR
- UV
- Beamsplitting
- Phase-retarding
- Color splitting

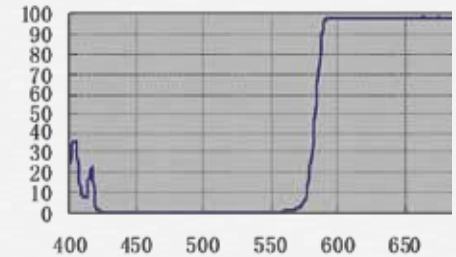
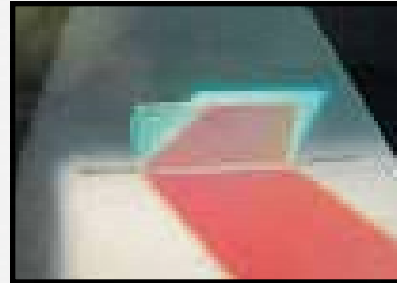


Coating inspection

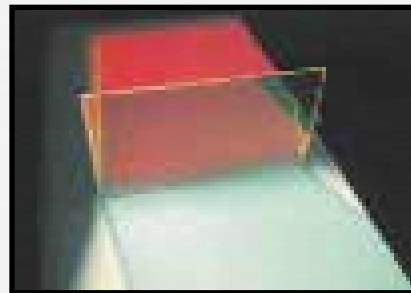
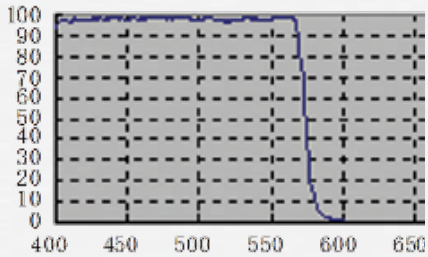
High performance coating examples



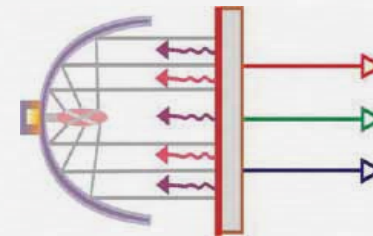
Color reflecting dichoric X-cubes



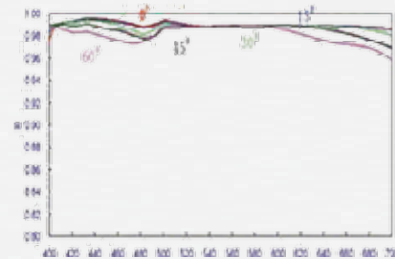
Long wavelength pass filter



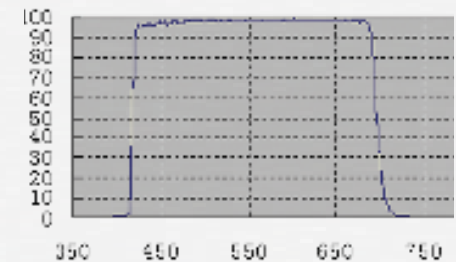
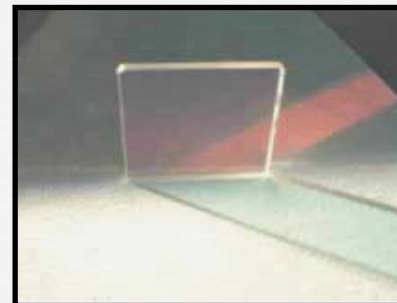
Short wavelength pass filter



Cold mirror-transmitting visible light



Wide angle high reflecting mirror





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