Engineering Services

Innovation doesn't just happen – you need the right people in the right place – Meadowlark Optics is that place and we have the right people. Whether your requirements are large or small, simple or complex, Meadowlark can design precision optics and mounting for your applications.

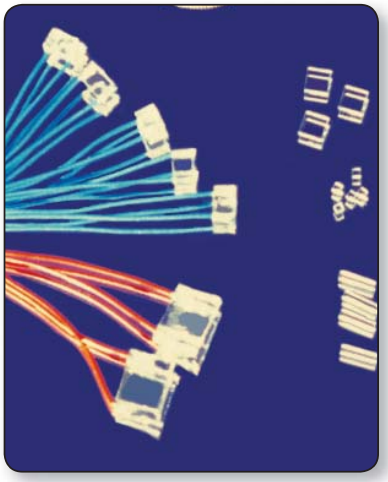
Meadowlark's team of researchers and engineers can help you solve your polarization optics and instrumentation problems. We have developed custom polarizers, polymer retarders, achromatic retarders, liquid crystal optics and polarization analysis instrumentation. Our skilled production staff can turn your custom designs into consistently manufactured products.

Meadowlark Optics has the expertise, facilities and instruments to ensure your parts are mounted and aligned exactly as required. Our group of Opto-Mechanical Engineers can build a mount to meet customer specifications using the latest CAD software and develop prototypes in our in-house machine shop. Plus, our collection of optical instruments, including proprietary devices, allows for mounting and verification of extremely tight optical and mechanical specifications. Working with Meadowlark Optics permits the entire process from design to volume manufacturing to be completed in the same building. This removes the hassle of transferring valuable information and losing time as different companies, development groups or manufacturing houses get up to speed on the changes. Here are a few of our custom polarization solutions...

Capabilities

Small Precision Optics

As optical components become integrated into OEM devices there is a need to restrict the dimensions of these components to ensure total package size requirements can be met. More importantly the parts must be manufactured without any loss in quality or optical characteristics. Meadowlark Optics has developed processes that allow us to efficiently build small polarizers and retarders, down to a few millimeters on a side for square parts or as tiny as 6 mm in diameter. Our unmounted PolyWave retarders can be built down to a millimeter per side with a usable clear aperture that extends to within 15 microns of the edge. Amazingly, these advancements are not only restricted to static components. Our active liquid crystal devices have gone even smaller than static parts, including some devices with a 1 mm circular clear aperture inside of a 3mm square device.



Custom Mounts/Sub-Assembly Work

When designing an optical instrument there are often difficult challenges that force optics to be installed in tight spaces to even tighter tolerances. Custom mounts are often required to hold components of varying sizes and shapes that cannot be supported by traditional mounting options. Sub-assemblies often require polarization components be mounted with sub degree accuracy, or be tilted to very specific angles away from normal incidence.

Custom Tunable Filters

Many applications require that researchers and scientists visualize minute concentrations of elements or compounds, or the changes in a continuous wavelength range. Meadowlark Optics line of Tunable Optical Filters allows the user to dissect an image into hundreds of individual wavelength images. Solar astronomers have used LC Tunable Filters for years (examples: imaging of solar flares and prominences or imaging the solar chromosphere) and now new applications in microscopy, spectroscopy, hyperspectral imaging and many other fields are being discovered and tested every day.

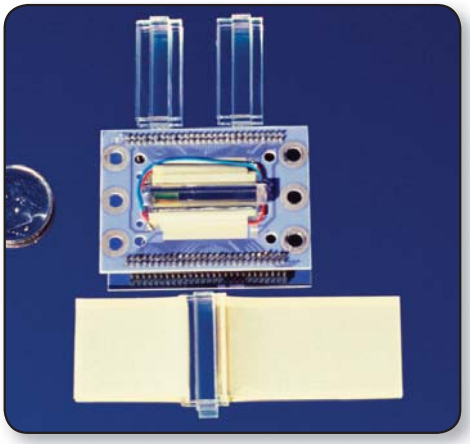
Design and construction of Tunable Optical Filters combines multiple areas of Meadowlark Optics expertise, including our Liquid Crystal Variable Retarders, instrumentation, fabrication and of course polarization. Our knowledge has lead to designs that overcome many issues that have been overlooked in the past. For example, the retardance of a LC cell is sensitive to temperature and variations in the environment surrounding the device can lead to measurement errors. As a result we have mounted our Tunable Optical Filter inside a thermally controlled housing to preserve the tuning accuracy of the device.

Meadowlark Optics offers a line of standard visible and near infrared Tunable Optical Filters that provide the insight and visualization you need. If the specifications of our standard devices are not ideal for your application we are very interested in designing a custom Tunable Filter to exactly meet your needs. Choose the wavelength range, full width at half maximum (FWHM) of the transmission peaks, tuning resolution, angular field-of-view and a number of other requirements and Meadowlark Optics will design the system needed to complete your experiments. We even have designs that allow for a variable FWHM at a single wavelength! Please refer to the Tunable Optical Filter section of the catalog (page 68) for more detail on these systems or call us to discuss your application requirements.

Capabilities

Custom Spatial Light Modulators

The applications for Spatial Light Modulators (SLMs) are broad and far reaching. From ultrafast laser pulse shaping to wavefront correction many tasks can be completed with our standard Linear and two-dimensional Hexagonal arrays. However, certain applications require larger active areas (clear apertures) in order to modulate the entire beam profile or maybe the pixels need to be arranged in a custom layout, like a series of concentric circles, for the experiment to be completed properly.



Meadowlark Optics would like to take on your need for a custom designed transmissive SLM. Modifications to the pixel size, dimensions and pattern can be completed by creating a new photo-mask and since the optical head, driver and software can be kept the same these changes can be completed without dramatic price increases or lead-times.

VersaLight™ Beam Splitting Polarizer

In an effort to offer more versatile products Meadowlark Optics has designed an extremely broadband (650 to 2000 nm) polarizing beamcube based around our line of VersaLight wire grid polarizers. Laminating a VersaLight polarizer inside two right angle prisms allows the component to exhibit the benefits of both the polarizer and cube. This means that you have an extremely broadband cube with a large acceptance angle that is easy to mount. These cubes can be made to transmit any polarization direction while reflecting the orthogonal polarization.

Most broadband polarizing beamcubes offer a useable wavelength range of 300-400 nm. The VersaLight beamcube offers a useable range of 1350 nm and can be used from 650-2000 nm without much variation in transmission or loss of contrast ratio. In fact, this cube has a transmitted contrast ratio of 500:1 or better through most of the useable wavelength range. It also pushes the limits of the field of view for polarizing beamcubes. The angular acceptance of the VersaLight cube is greater than ± 20°, compared to ± 3° for most thin film beamcubes, opening up many uses and applications that were not possible with thin film polarizer designs. This cube continues the Meadowlark Optics tradition of innovation and quality construction by providing better specs and more performance to our customers, allowing them do to and see things that were never possible before.

Custom Retarders

When completing an application where the wavelength of interest is different from a standard light source wavelength it can be difficult to find an accurate retardation plate. The cost of polishing an entire batch of crystal parts (quartz, magnesium fluoride, sapphire, etc.) will make the prices of low quantities of these retarders very expensive. Using our polymer processing facilities, Meadowlark Optics can create a custom retarder for your specific wavelength. Custom retardances, such as eighth-wave or tenth-wave are also available. We also have the ability to create retarders with custom dimensions or large areas to fit perfectly within your unique optical design.

Micro Retarders

Other distinctive retarders that Meadowlark Optics can produce include a product we call Micro Retarders. These components were originally designed for use inside telecommunications systems and their primary characteristic is their thickness, or more appropriately their thinness. These retarders measure less than 20 microns thick, less than five millimeters per side and have almost perfect transmission characteristics. Like our standard polymer retarders these parts are available for any wavelength and any retardance.

Capabilities

Pockels Cell Modulators

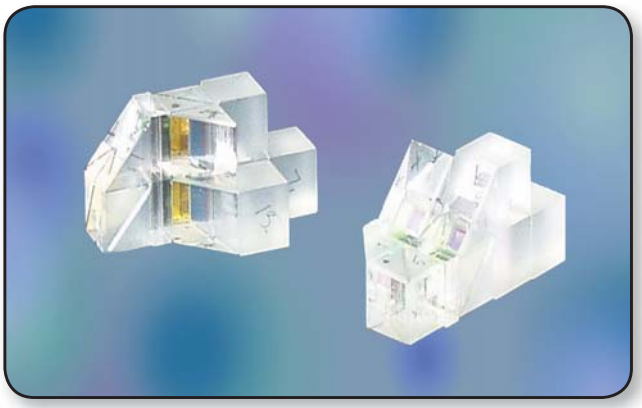
Our longitudinal Pockels Cells are often used in polarimetry on imaging light beams and in the chopping of polarized beams. They consist of Z-cut KD*P crystals between protective windows that have transparent indium-tin oxide electrodes applied to their interior faces. The electrodes produce a uniform electric field normal to the optical faces and permit use of a thin (less than 3 mm) KD*P crystal. This makes these cells suitable for use in non-collimated imaging light beams slower than f/20. Meadowlark specializes in clear aperatures up to 40 mm. These devices are useful as variable retarders in applications requiring much faster switching

Unique Custom Capabilities

Over the years Meadowlark Optics has been asked to deliver some unique polarization components. Our reputation for quality and innovation has made us the company that many people turn to when they need a device that is not readily available.

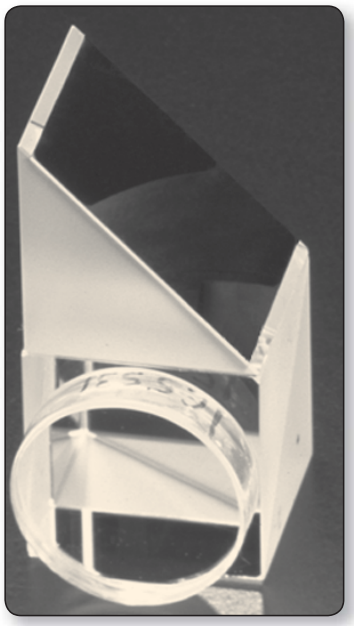
Examples of these devices include a segmented polarizer that contained four different quadrants, where each quadrant had its polarization transmission axis in a different orientation. Another is an assembly of polarizing beamcubes that can take an input beam and separate it into multiple output beams with varying linear polarization directions. We also have manufactured an optically addressed spatial light modulator.

Our engineers have spent years designing these components for various applications and they have the imagination and knowledge to build a component that will perfectly fit your needs. So if you have an idea for a polarization component that you cannot find anywhere else talk to Meadowlark Optics.



Engineering Services/Consulting

When faced with a problem related to polarization it can be very difficult to come to a solution that takes into account all of the issues that need to be considered. Many times optimizing one parameter of a system leads to degradation somewhere else and these tradeoffs need to be characterized in order to create the best system possible. The engineers at Meadowlark Optics have the educational background, technical knowledge and most importantly years of experience to help you properly identify and solve the problems you face.



Outside of their personal experiences our engineers have access to numerous polarization modeling and simulation programs that can compute the expected polarization output after an arbitrary polarization state is passed through any number of components. When modeling does not provide enough information we have a number of state of the art optical measurement systems and techniques that measure retardance down to 0.001 of a wave or angular accuracies of less than half a degree.

So when faced with a polarization problem that threatens to slow down your progress contact Meadowlark Optics and allow our group of engineers to provide you with the correct solution.

Meadowlark Quality Standards

At Meadowlark Optics, people are our strength and we believe in providing them with the best tools to do the job. The precision and quality our customers demand are part of everything we do.

At the heart of our process is our precision metrology. This automated ellipsometer provides fast, accurate retardance measurements.

Proprietary analytical tools, state-of-the-art system and component designs, as well as computer-controlled manufacturing equipment come together to ensure quality and consistency in all Meadowlark Optics products.

All our optical components and instrumentation are assembled to some of the most exacting standards in the industry by our highly trained staff. We take precision seriously and we back it up with our warranty.

Ordering Information

Payment Terms

US and Canadian customers are eligible for Net 30 Day terms, upon credit approval. Prepayment is generally required for international orders. Visa, MasterCard, Discover and American Express are also gladly accepted.

Product Returns

If you need to return a product, please contact Meadowlark Optics for an authorization number to aid in tracking returned goods. Freight charges must be prepaid. All returned catalog products meeting specification are subject to a 25% restocking charge. Custom products performing to specification can not be returned for credit or refund.

Specifications

Listed specifications are accurate as of the publication date. Product improvements and design changes may alter product specifications without notice.

Customer-Furnished Material

Although great care is taken in handling all customer furnished material (CFM), occasionally parts may be damaged in process. CFM is accepted at customer risk. Meadowlark Optics is not responsible for damage or breakage to CFM.

Warranty

All products in this catalog are warranted against defects in materials and workmanship for a period of one year from the date of shipment. Liability of Meadowlark Optics is limited to the defective product value only.

Extended warranties are available. For more information, contact Meadowlark Optics for specific details.

As always, Meadowlark Optics products are made right here, in Colorado.

Five Easy Ways to Order!

1. **Telephone** (303) 833-4333 Our Sales Staff is available Monday through Friday from 8 am to 5 pm (Mountain Time) to assist you.
2. **Fax** (303) 833-4335
3. **E-mail** mlo@meadowlark.com
4. **Mail** PO Box 1000
   Frederick, CO 80530-1000
   United States of America
5. **Website** www.meadowlark.com

Shipping

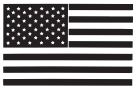
We will use our best judgement regarding shipping method, unless a specific carrier is requested. Freight charges are prepaid and added to the invoice.

International Distributors

For a list of our current international distributors, please visit our website: www.meadowlark.com

Export Control Laws

Due to the high technical precision and diverse applications of Meadowlark Optics products, the export or re-export of this merchandise may be controlled by US export control regulations. The products are offered for sale under the express consideration that the buyer will conform with these laws.



Made in USA