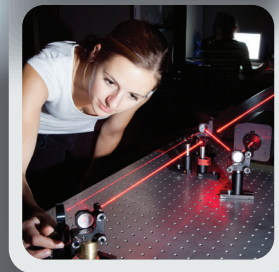
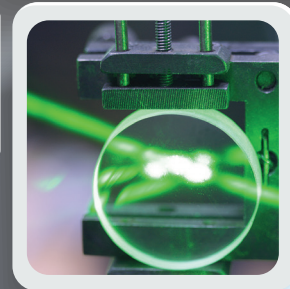
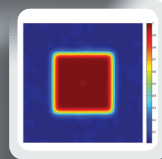
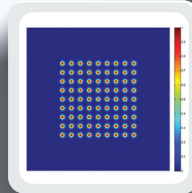


HOLO/OR



Company Profile

Holo/Or Ltd. develops, designs and manufactures diffractive optical elements (DOEs) micro-optical elements and Opto-mechanics modules. Our DOEs are being used for various applications mainly involving high precision and high power lasers. Thousands of customers from around the globe are already using our technology.

Holo/Or was founded in 1989 by Israel Grossinger, and it was the very first company to develop high efficiency DOE for commercial use at affordable prices. Thereafter, Holo/Or developed a process for high laser damage threshold DOEs which until today only a few companies worldwide are able to offer.

For almost 3 decades, Holo/Or has gained considerable know-how in design, simulations and manufacture of DOEs, using its in-house IP software and tools. Holo/Or works with hundreds of customers and 8 active distributors in 4 continents. We work with most of the largest laser companies in USA, China, Japan, South Korea and Germany.

Diffractive Optics Overview

A DOE uses thin micro structure patterns to alter the phase of the light propagated through it. Those micro-structures, once properly designed, can manipulate the light to almost any desired intensity profile or shape. Holo/Or can produce DOEs out of Fused Silica, Sapphire, ZnSe, Polycarbonate, PMMA and more. Most DOEs are designed for a specific wavelength.

This technology enables many functions and light manipulations which are not feasible with standard refractive optics. In many applications those functions are very beneficial and significantly improve the system's performances.

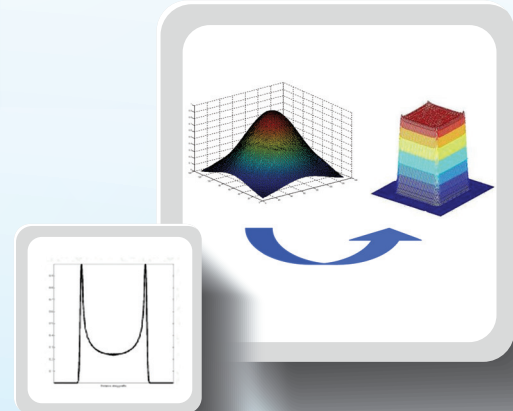
The Early Pioneer of Diffractive Optics

Beam Shaper

A Top Hat beam shaper converts a near-Gaussian input beam into a specified image shape with uniform energy distribution at a specified working distance. The energy profile of this image has very small transition regions, which provides defined borders between the treated and untreated areas. Top hats typically have an efficiency of over 95%, and high uniformity. They are however sensitive to X-Y misalignment, input beam size and defocusing. It is also possible to design a designated energy profile for specific application, such as M-Shaper, designed for scanning application.

Applications:

- Laser materials processing: perforation, welding, cutting, scribing, ablation and drilling
- Biomedical applications
- Laser displays
- Marking and printing



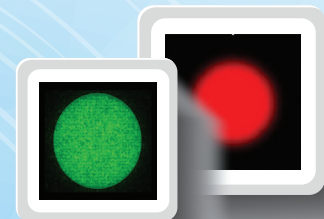
M-Shaper Energy profile

Homogenizer

An optical Diffuser/Homogenizer transforms a single or multi-mode input beam into a well-defined output beam, characterized with a desired shape, and homogenized intensity. Holo/Or's optical diffuser DOE is mainly used for high power laser applications, when uniform exposure is needed, with accurately defined sharp shaped edges, while enabling high efficiency. The most common diffuser shapes are: round, square, rectangular, elliptical and hexagonal, however, almost any shape of image can be designed. It is also possible, to tailor the intensity distribution of the image, so that different areas receive more/less energy.

Applications:

- Laser homogenizing/shaping
- Laser material processing: perforation, ablation, derailing, marking, scribing and welding
- Medical/aesthetic laser treatment
- Beam shaping for Excimer lasers
- Hot spot reducer

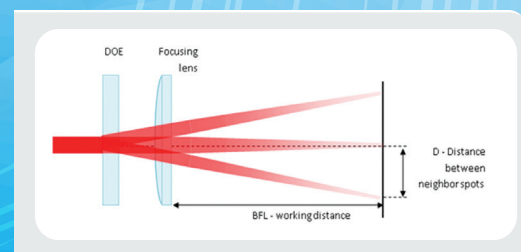


Beam Splitter

Beam Splitter is a diffractive optical element used to split a single laser beam into several beams, each with the characteristics of the original beam (except for its power and angle of propagation). An optical beam splitter can generate either a 1-dimensional beam array (1xN) or a 2-dimensional beam matrix (MxN), depending on the diffractive pattern on the element. Custom designs of number of spots and their locations are available according to customer / application needs.

Applications:

- Parallel material processing
- Medical/aesthetic treatment
- Laser scribing (solar cells)
- Glass dicing (LCD displays)
- Laser display & illumination
- Machine vision & 3D sensors
- Fiber optics

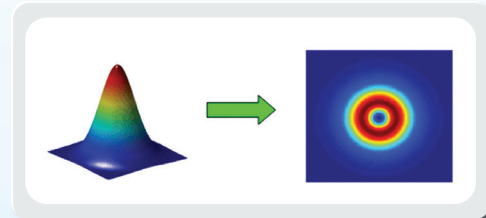


Ring generator (Vortex Lens/Axicon)

A Spiral Phase Plate (Vortex, for Gaussian beam) or Diffractive Axicon are designed to convert any laser beam into a small donut-shaped energy ring. Multi-circles solution is available as well.

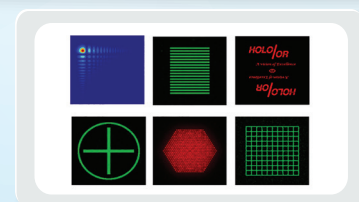
Applications:

- Solar coronagraphs (astronomy)
- High-resolution microscopy
- Optical tweezers for particle trapping & manipulation
- Lithography
- Quantum optics
- Material processing (Welding, cutting)



Structure light / Different Patterns

By using DOE, almost any light pattern generation is possible:

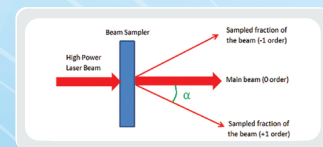


Beam Sampler

Diffractive Beam Samplers are used to monitor high power lasers where optical losses and wave front distortions of the transmitted beam need to be kept to a minimum. In most applications, most of the incident light must continue forward, "unaffected" while a fraction of the beam is diffracted into a higher order, providing a "sample" of the beam. With this beam sample, it is possible to monitor, in real time, all the laser's parameters, including its profile.

Applications:

- Monitoring
- Inline beam profiling

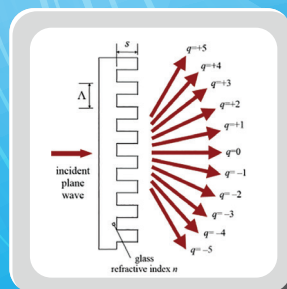


Gratings

The Binary Phase Grating is a special case of a 1D Dammann grating with a duty cycle of 50% within a period. Holo/Or gratings are transmission grating. In addition to standard gratings, Holo/Or can offer gratings with custom specifications (duty cycle, modulation depth, period, reflection or transmission grating).

Applications:

- Parallel material processing
- Laser monitoring
- Spectroscopy
- Microscopy
- Metrology
- Scientific research

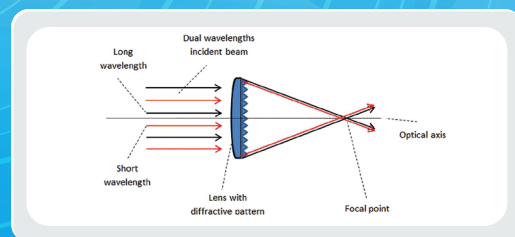


Dual Wavelength

This focus combiner is used for combining CO₂ laser focus and its visible aiming beam focus into a single focal point. Dual Wavelength DOE corrects the strong chromatic aberrations between a CO₂ laser and its visible aiming beam. The focal length for both wavelengths is determined during the design, according to the customer's needs.

Applications:

- Surgical laser systems
- Industrial CO₂ laser systems
- Correction of chromatic aberrations of any 2 wavelengths.

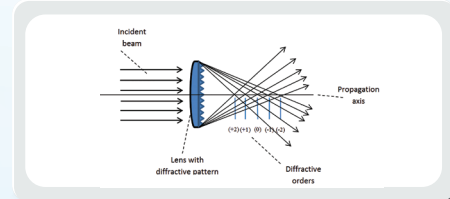


Multifocal Lens

Multifocal Diffractive Optical Elements allow a single incident beam to focus simultaneously at several focal lengths along the propagation axis. The number of focals and the separation between them is predetermined during the design of the Multifocal DOE.

Applications:

- Ophthalmic application
- Optical sensors
- Parallel zoom systems
- Material processing
- Laser glass cutting
- Laser micro-machining

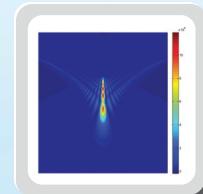


Elongated Focus

Holo/Or's extended depth of focus is a new solution achieving extended (longer) depth of focus as well as high lateral resolution (small beam waist). Such a solution that present these two conflicting characteristics simultaneously are needed for a variety of applications. Our novel method achieves this extended depth of focus, while keeping the laser spot size very small. This solution provides a continuous energy profile along the DOF. For comparison, achieve DOF 10 times longer than Rayleigh length is easy by using EF solution.

Applications:

- Cutting
- Drilling
- Microscopy



Accessories

Holo/Or provides a variety of optical systems and opto-mechanic accessories for diffractive optical elements.



- **UDOB:** A compact universal module for blocking undesired spots of Multi-Spots or parasitic energy of Homogenizers.
- **DOE Tuner:** A variable beam tuner, optimized for use with beam shapers, Homogenizers, Beam Splitters, and other DOE products.
- **Dielectric Mask:** Dielectric masks are glass substrates that have a very thin (~1µm) patterned reflective coating. The coated part reflects the incoming beam while the uncoated part transmits the beam.
- **Beam Shaping Focuser:** For applications requiring an aberration-free image in focal plane, with a high precision, Holo/Or developed a new optimized focusing module to be used with our Beam Shapers.
- **DOE Expander:** Holo/Or introduces a new module for modifying certain output parameters of a Diffractive Optical Element (DOE). The module reduces or expands the full angle of a DOE output by a magnification factor.

Services

Holo/Or offers a complete set of solutions/services to support our customers' needs and the use of DOEs. Our services include optical design of DOE, refractive optics, opto-mechanical design. In addition, we provide simulations services of diffractive & refractive optics and feasibility studies for new solutions or applications.