HOLO/OR

A VISION OF EXCELLENCE

HOLO/OR

Holo/Or is the world leader for Diffractive Optics

1989
- Holo/Or established

1994
- First commercial use of CO_2 diffraction limited DOE

2013
- Steady growth in laser usage begins showing affect on Holo/Or's DOEs demand

2017
- Continuous growth leads to re-organization and enables wafer level production

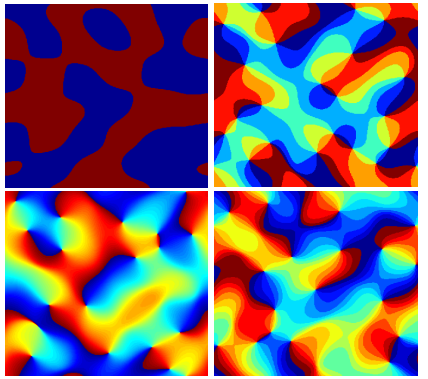
2019
- New POG product line

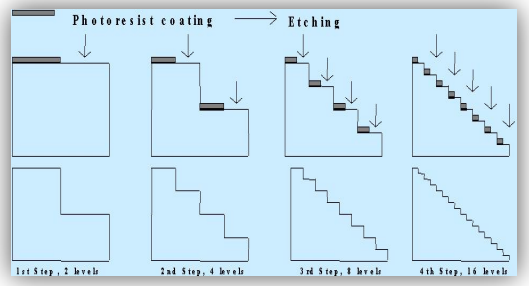
2020
- Strategic partnership with **TechInvest Holding Ag** (Scanlab)

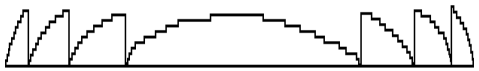
- First to deliver DOEs for commercial use
- Break through technology
- Vast experience & expertise
- Diverse and extensive collection of beam shaping solutions

Holo/Or develops, designs and manufactures DOEs

- DOEs are thin diffractive windows that shape light
- Any desired intensity profile or shape
- In many applications DOEs **significantly improve system performance**
- DOEs advantages:
  - High (absolute) angle precision
  - High LDT
  - Thin & compact
  - Flexible shaping in single surface



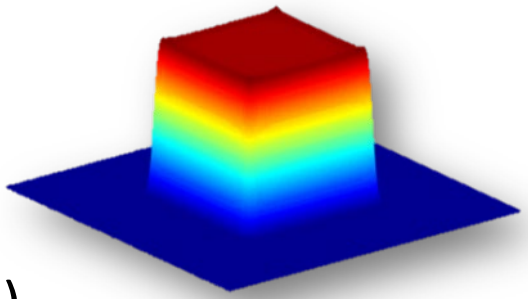


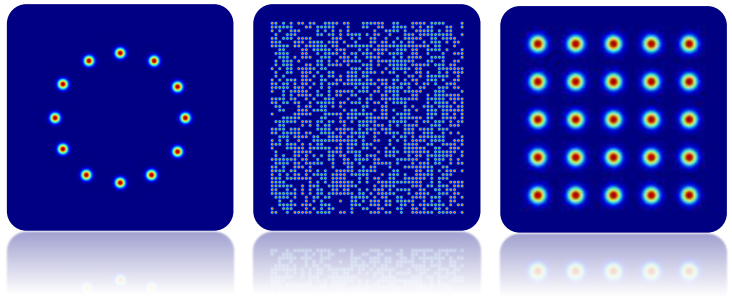


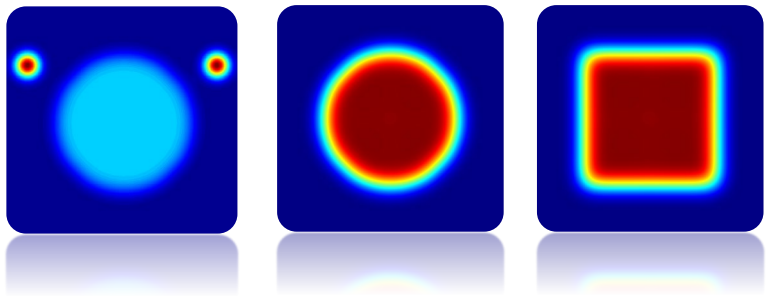
The power of Diffractive Optics

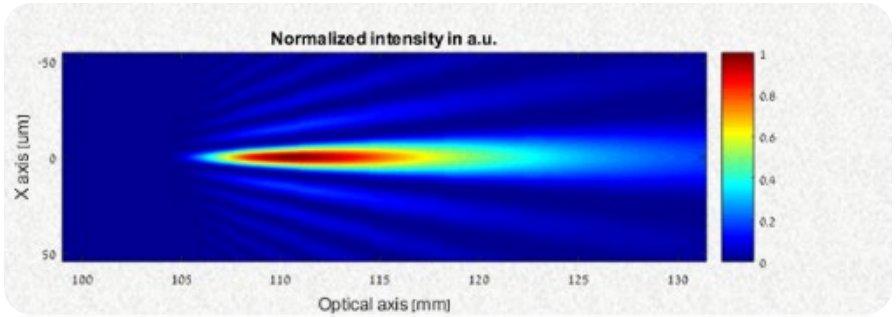
Main DOE families:

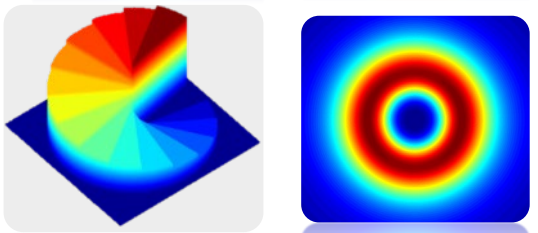
- Beam Splitters
- Beam Shapers
- Beam Foci (Focal shapers)





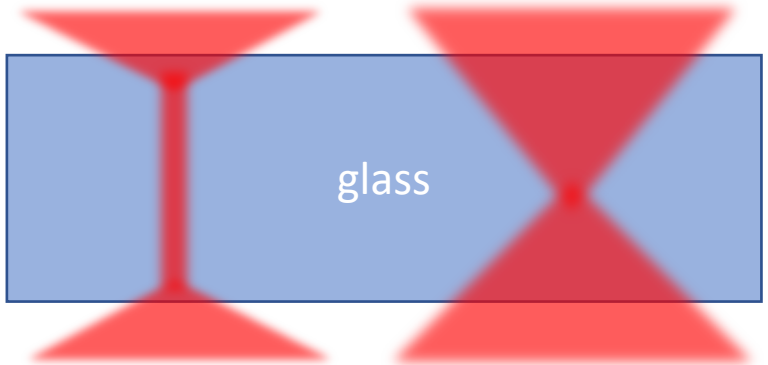






Glass filamentation cutting using non-linear plasma process, main cut

- Typical characteristics:
  - ~1um wavelength
  - 10-40KHz rep rate
  - pulsed ps laser
  - µJ - mJ power range
- 1-5µm tight focus is required to reach process threshold
- **Depth of focus needs to be of the order of the glass thickness, typically 1-3mm**
- Thus, DOF can be >1000 Rayleigh lengths

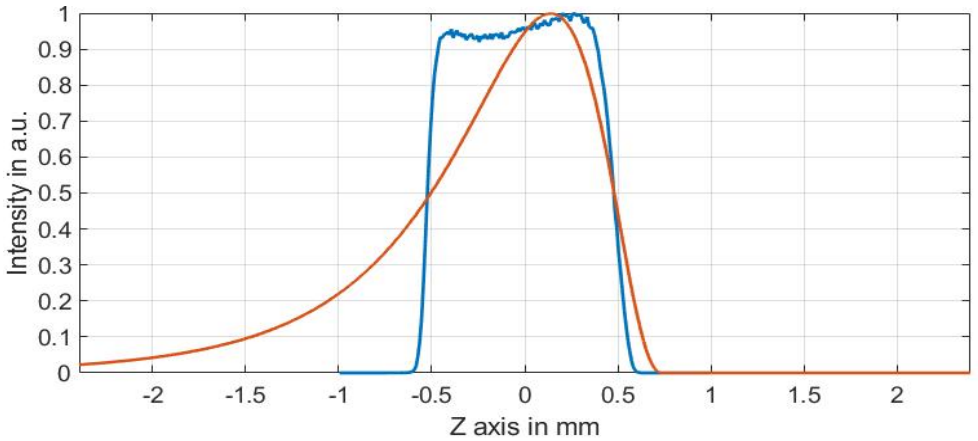


required focus for glass cutting

Gaussian beam focus

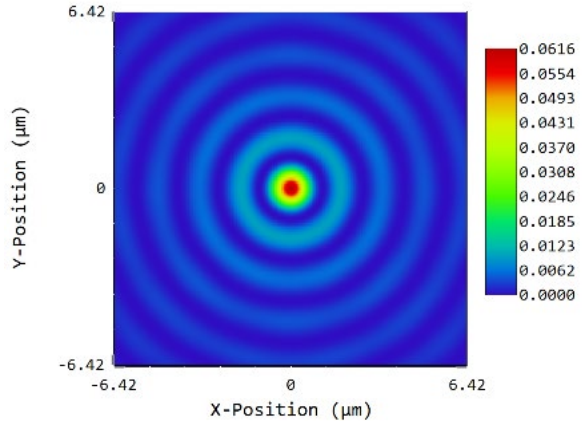
Solution through the DeepCleave Module

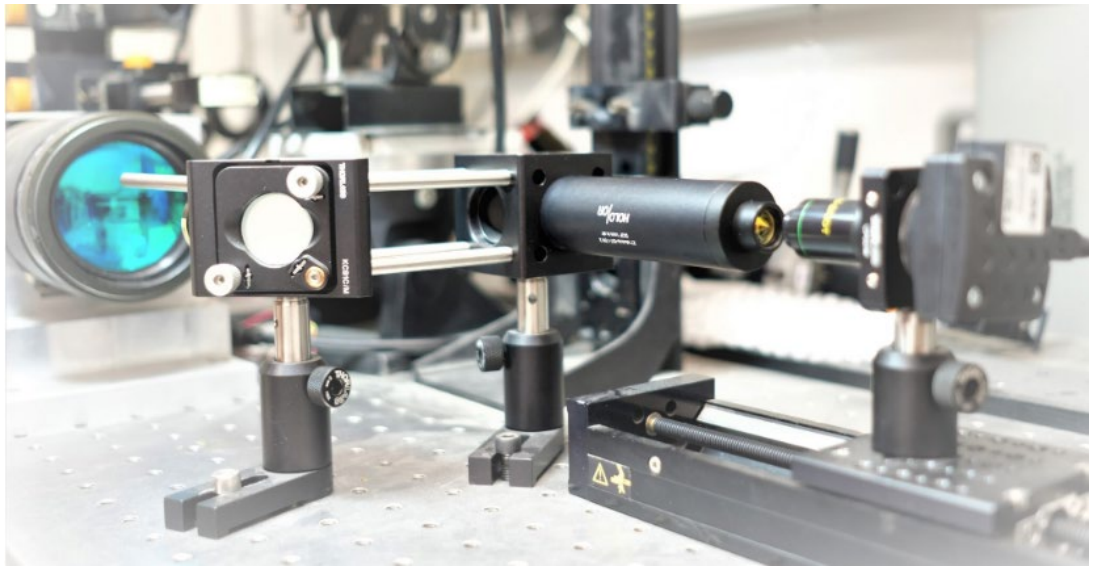
- Input: 6mm diameter single-mode laser beam
- Output: Tight spot with ~ 1.8 um waist size along the **entire Depth of Focus** (1-2mm typical range)
- Equivalent to NA =0.35 objective and is ideally suited for glass cutting of thick glasses, such as flat panels
- A **complete optical solution** for cutting applications
- No need for additional high NA objectives or other high cost optics



DeepCleave™ Glass cutting Module by Holo/Or Ltd.

- Each Module is individually tested for performance using our custom built automatic setup
- By adjusting beam size the Flat top slope in Z can be changed
- Straightforward Installation & calibration procedure is provided in attached manual

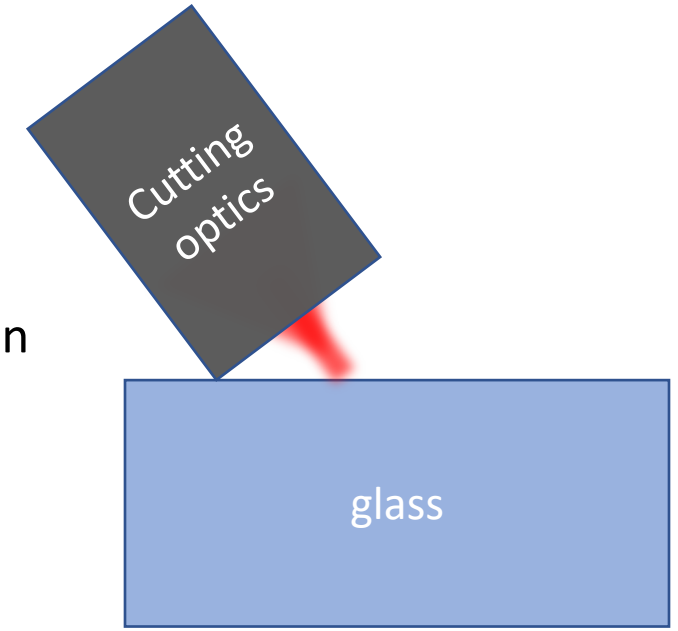




Laser glass cutting for edge bevel at 45 deg

- Typical cut:
  - 200-300µm long
  - 45 deg to optical axis
- Laser parameters are the same as for the main cut using filamentation method
- Tight focus similar to main cut
- Challenges with tilting the cut optics:
  - **Complex path cutting requires continuous rotation of the optic**
  - **Cut optics (such as DeepCleave) has very short work distances**

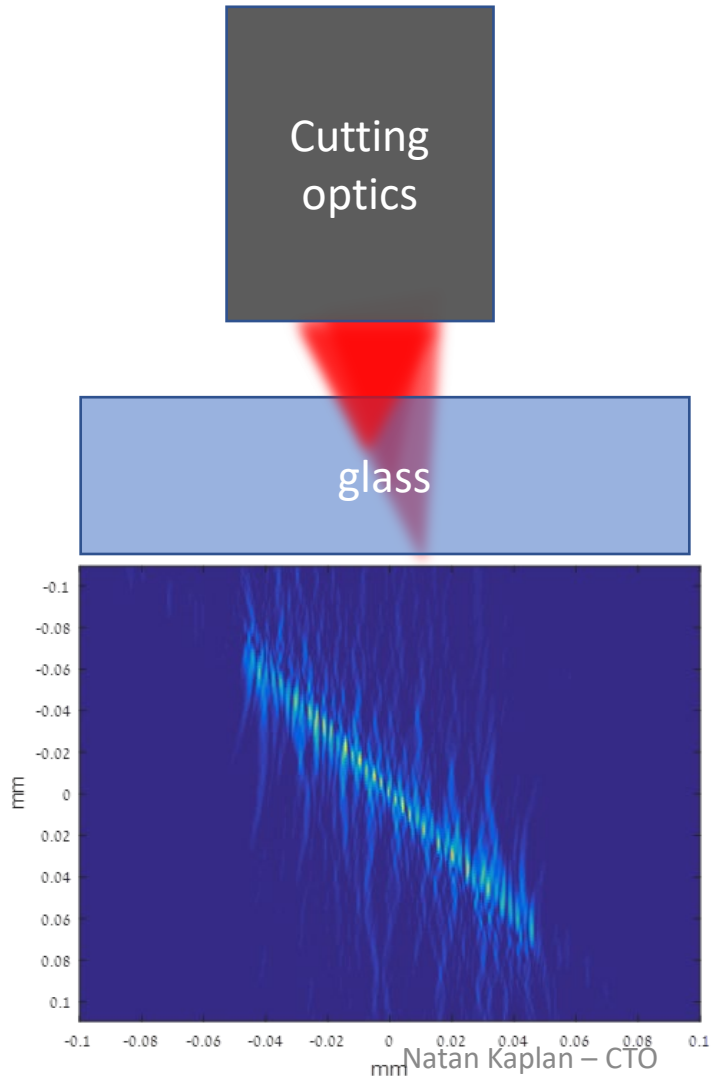
  and cannot be tilted to give 45 deg due to opto-mechanical limits



Solution through shifted multifocal element

- A single DOE+ focusing optics such as aspheric lens
- DOE generates multiple orders with shift in the x and Z direction
- Prevents need for rotating the cutting optics, only the DOE
- Has good depth of focus and work distance (~20mm typically), comes vertically to the glass surface
- Can be added as post processing step after main cut

- Holo/Or is developing a less speckled solution, with smoother intensity distribution.



Thank you!

Feel Free To Ask **Questions**

For more detailed follow-up, contact us at : holoor@holoor.co.il

30 YEARS
A VISION OF EXCELLENCE