HOLO/OR A VISION OF EXCELLENCE

# How to integrate a Diffractive Axicon Lens into an optical system in ZEMAX

## Written by HOLO/OR Ltd.

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# Content



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# 1. Preliminary reading

1. HOLO/OR's application note for Axicon Lens: https://www.holoor.co.il/application/diffractive-axicon-application-notes/
2. ZEMAX manual for Radial Grating surface

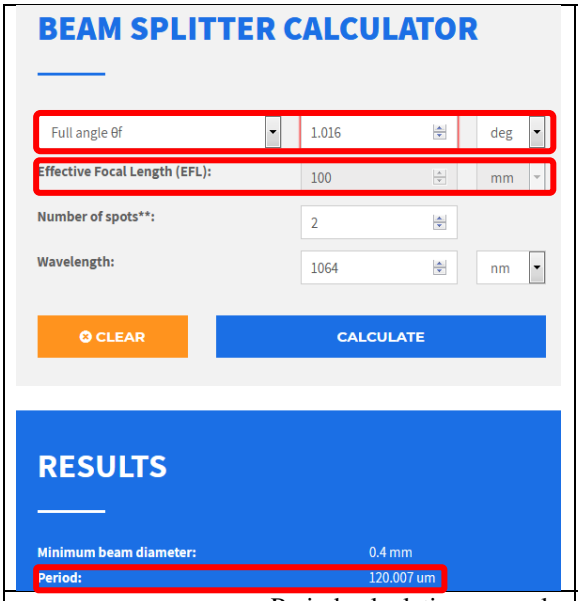
# 2. Design example based on DA-039-I-Y-A

## 2.1. Specifications table

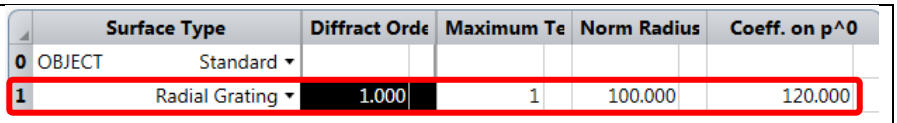
| INPUT PARAMETERS | | ELEMENT PARAMETERS | | OUTPUT PARAMETERS | |
|---|---|---|---|---|---|
| Wavelength [nm]: | **1064** | Element Type: | **Window** | Ring Angle P2P [deg]: | **1.02** |
| Minimum Beam Diameter [mm]: | **0.36** | Material: | **Fused Silica** | Axicon Type: | **Negative** |
| Beam Mode (SM/MM): | **SM or MM** | Element Size [mm]: | **25.4** | Transmission efficiency: | **Close to 100%** |
| | | Clear Aperture [mm]: | **22.9** | Overall Efficiency: | **~ 95%** |
| | | Thickness [mm]: | **3** | Zero-Order relative to | |
| | | Coating: | **AR/AR coating** | the incident beam [%]: | **<1** |

## 2.2. Modeling of Axicon Lens in Sequential mode by steps

1. Input the general parameters of the simulation – aperture size, and wavelength
2. Input a Radial Grating surface and set the following parameters:
   a. Define **Diffraction Order** (Par 0) value -1 for positive Axicon and +1 for negative Axicon
   b. Set 1 in **Maximum Term #** (Par 13)
   c. Calculate period size of Axicon using HOLO/OR calculator for Beam Splitter by setting the Full angle in the calculator to be the Axicon Ring Angle, and Number of spots in the calculator to be 2.
   d. Set period size in um in **Coeff. On p^0** (Par 15). For example: period of 120um:




Period calculation example



| | Surface Type | | Diffract Orde | Maximum Te | Norm Radius | Coeff. on p^0 |
|---|---|---|---|---|---|---|
| 0 | OBJECT | Standard | | | | |
| 1 | | Radial Grating | 1.000 | 1 | 100.000 | 120.000 |

Parameters for Radial Grating Surface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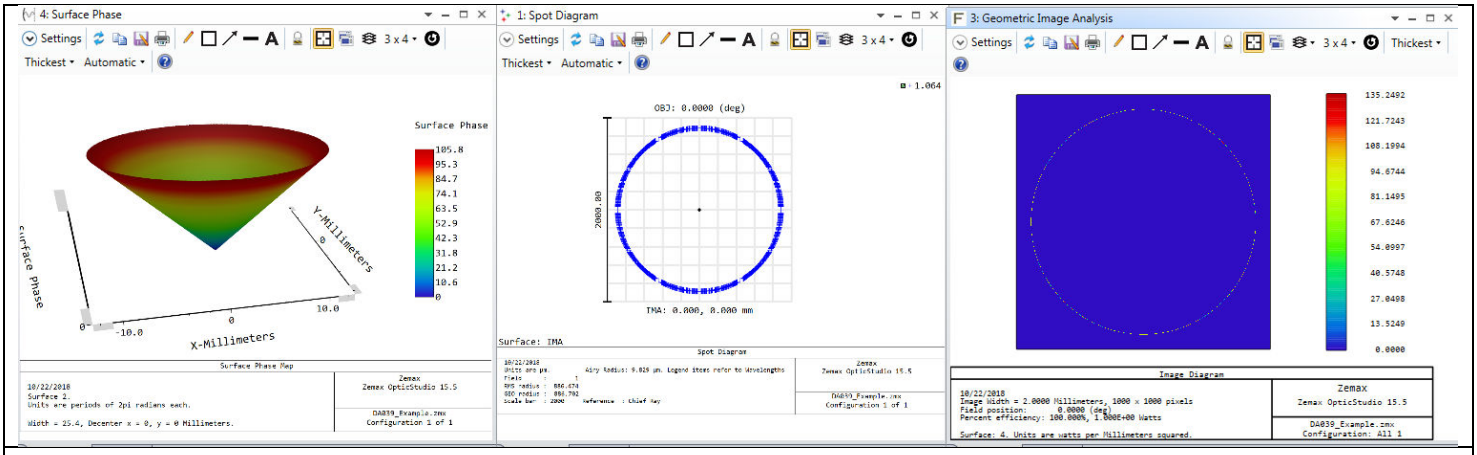
## 3. Analysis methods

The analysis can be made by standard analysis tools for example Surface Phase, Spot Diagram, and Geometric Image Analysis.




Screen examples from ZEMAX interface

## 4. Summary:

We show a method to model Diffractive Axicon Lenses in ZEMAX sequential mode

## 5. Examples file for download:

[Example DA039]

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