

How to build basic setup using ZEMAX Black Box of Top Hat beam shaper? Holo/Or 2019

- 1. **Download Top Hat model** file from our <u>standard elements</u> and place ZBB file into ZEMAX Black Boxes folder C:\Users\????\Documents\Zemax\BlackBoxes
- 2. Open new ZEMAX file with follow surfaces:
 - 2.1. Dummy surface (1) before Black Box Lens surface
 - 2.2. Black Box Lens: in Comment parameter enter ZBB file name
 - 2.3. Paraxial lens (just for example): enter values of Focal Length and Thickness, or user system with objective or real lenses

3. Define environment parameters:

- 3.1. Change wavelength to desired one
- 3.2. Modify beam size
- 3.3. Apodization Type should be Gaussian
- 3.4. Apodization Factor 6.25 (equivalent to 2.5 times beam size) recommended
- 3.5. Aperture Value should be nominal beam size x2.5 recommended

			View of	of Lens Data	Editor (in	the exam	ple below, the b	beam siz	e is 10mm a	tt 1/e2)	
📄 Lens Dat											
Update: All	Windows 🔹 🕂 🍚 💹 🚽	< <mark>-/∡</mark> 🛊 ∌	# O· 🖠	\$ 🗌 🤉 🕹							
Surface 2 Properties					Configuration 1/1 🔇 📎						
	Surf:Type	Comment	Radius	Thickness	Material	Coating	Semi-Diameter	Conic	TCE x 1E-6	Par 1(unuse	
0 OBJECT	Standard 🔻		Infinity	Infinity			0.000	0.000	0.000		
1	Standard 🔻	DUMMY	Infinity	0.000			12.500	0.000	0.000		
2 STOP (a	aper) Black Box Lens 🔻	TH258.ZBB		<3.000>			12.700 U		0.000		
3	Paraxial 🔻			100.000			12.500		0.000	100.000	
4 IMAGE	Standard 🔻		Infinity	-			0.024	0.000	0.000		
	Wavelength definition				Aperture definition						
Sy	stem Explorer 🕜			🗶 Ф		System E	cplorer 🕜			- -	
Up	Update: All Windows 🕶				Update: All Windows 🕶						
F	Aperture				✓ Aperture						
F	▶ Fields					Aperture Type:					
-	 Wavelengths 										
	Settings					Entrance Pupil Diameter 🔹					
	 Wavelength 1 (1.064 um, Weight = 1.0) 					Aperture Value:					
	📝 Enable					25.0					
	Primary					Apodization Type:					
	Wavelength (µm):				Gaussian 👻						
1.064				Apodization Factor:							
						(6.25				

 Tel +972-8-940-9687
 www.holoor.com

 Fax +972-8-940-9606
 holoor@holoor.co.il

Einstein 13B, Science Park Ness Tziona 7403617



4. Results analysis

There are many possible analysis methods presented in ZEMAX not including POP (physical optics propagation)

4.1 To use Geometric Image Analysis Edit the parameters of as follows

- 4.1.1. Image Size to be big enough to see the whole shape of Top Hat (in mm)
- 4.1.2. Show in False Color
- 4.1.3. Rays number and pixels the more the better

	Geometric Image Analysis in Analyze Tab	Properties for simulation					
3	Help	F 1: Geometric Image Analysis					
		📀 💈 🖬 📓 🖨 🖊	🗆 🖊 🗕 A 🔒 🔂 🖥	₿ 3 x 4 • (Standard •		
Ext	ended Scene Physical Beam File Gaussian Fiber Analysis • Optics Viewer Beams • Coupling •	Field Size:	0	Wavelength:	All	•	
		Image Size:	0.1	Field:	1	•	
F		File:	LETTERF.IMA	•			
	Gé	Rotation:	0	Edit IMA File			
. (Lid	Rays x 1000:	1000 🗘	Surface:	Image	•	
F	Pa Purely geometric assessment of image quality most useful for computing multi-	Show:	False Color 🔹				
F	Ex mode fiber coupling efficiency	Source:	Uniform 🔻	# Pixels:	125	5 2	
RI	Re	1					
F	IMA and BIM file viewer						
5	Bitmap File Viewer						

4.2 To Huygens PSF analysis (more accurate than geometrical analysis) edit parameters of as follows:

4.2.2. Pupil Sampling to define result precision (higher=better precision)

4.2.3. Image Sampling to define number of pixels in image plane (higher= more detailed result)4.2.4. Image Delta defines pixel size in um units in image plane

HUYGENS PSF in A	Analyze TAB	Properties for simulation					
Part Designer Programming Help	Zemax OpticStudio 19.4 SP.	C Settings 2 🗟 🖓 👘 🖊 🗌 🗡	— A 🔒 🖸	🚡 😂 3x4• 🕻	Standard		
PSF MTF RMS Enclosed Extended Scene Physical Beam PFT PSF FT PSF LVC FFT Cross Section	Pupil Sampling: 128 x 128 • Image Sampling: 128 x 128 •	Wavelength: Field:	All	•			
Image: Intervise Sector Image: Im	Image Delta: 1	Type:	Linear	•			
L/C HC	aterial Coating Sen	Rotation: 0 Use Polarization Use Centroid Auto Apply OK C	Show As: Normalize	False Color	Reset		

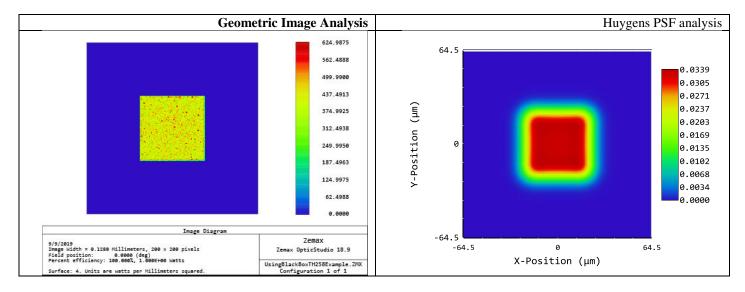
 Tel +972-8-940-9687
 www.holoor.com

 Fax +972-8-940-9606
 holoor@holoor.co.il

Einstein 13B, Science Park Ness Tziona 7403617



5. Analysis results:



Comparison between the analysis methods.

Geometrical Image Analysis is faster than Huygens PSF. Huygens PSF gives much better evaluation of transfer region, aberrations and tolerances.

6. Link to example file for downloading

 Tel +972-8-940-9687
 www.holoor.com

 Fax +972-8-940-9606
 holoor@holoor.co.il

Einstein 13B, Science Park Ness Tziona 7403617