

Description of Slit Mask Geometry
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December 1, 2006

The purpose of this memo is document the shape and position of the Binospec slit masks. The area of each slit mask that will contain slits is shown in Figure 1.

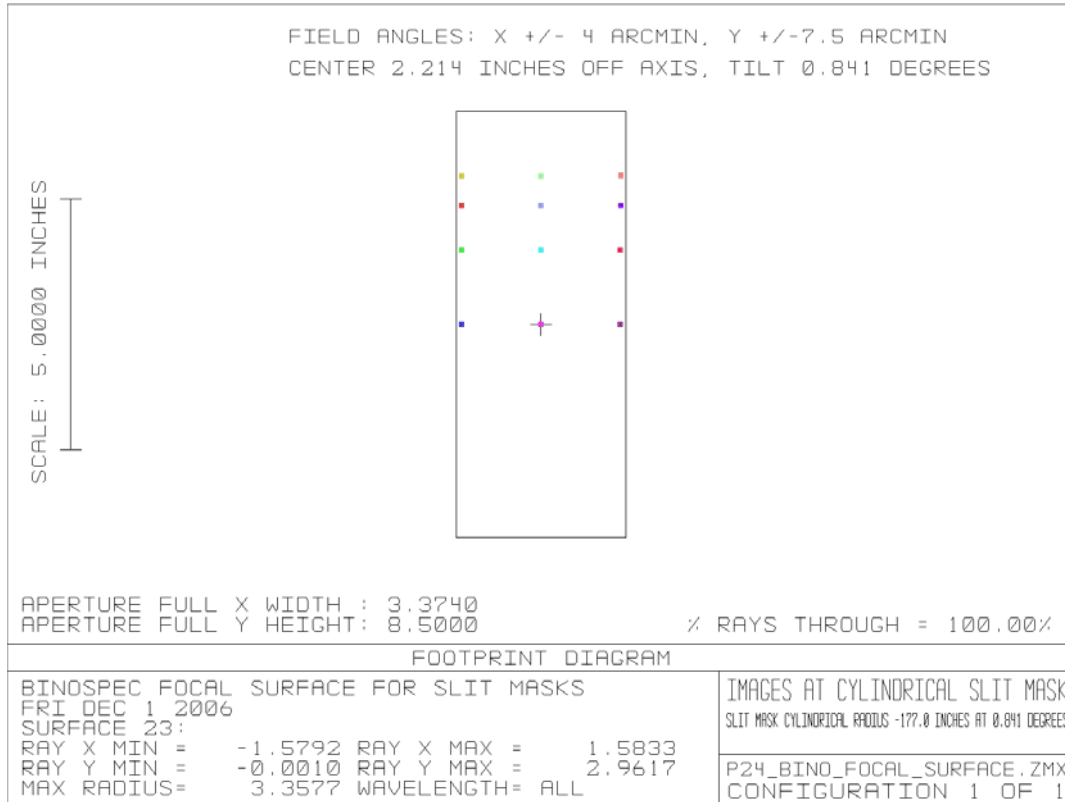


Figure 1. One half of the “active” area of the slit masks. The active area is that area occupied by slits. Only positive Y field angles are shown. Units are inches.

The telescope focal surface is a hyperboloid of revolution with a vertex radius of curvature of -134.01575 inches and a conic constant of -665. The images on this surface are shown in Figure 2.

We are approximating the hyperbolic telescope focal surface with tipped cylindrical surfaces for each beam. The tip is about the long axis of the slit mask at the center of each individual slit mask. The cylindrical bend is about the short axis of the slit mask, symmetric about its center. In Figure 3, the images using the best cylindrical radius for the nominal tip of the optics (0.72°) is shown. In Figure 4, we allow both the cylindrical radius and the tip angle are allowed to vary, and find that we can obtain slightly better balanced images. We therefore adopt:

Table 1. Adopted slit mask shape.

Cylindrical radius	-177.0 inches
Tip angle	0.841°

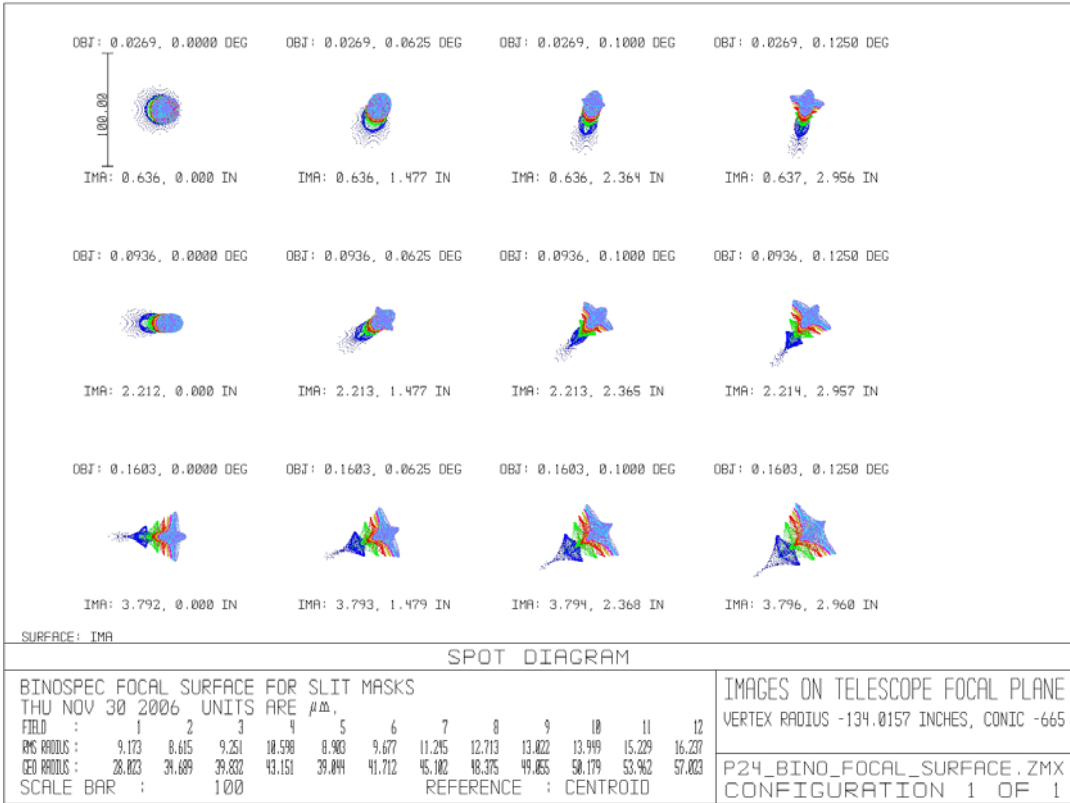


Figure 2. The images on the telescope focal surface, an hyperboloid of revolution.

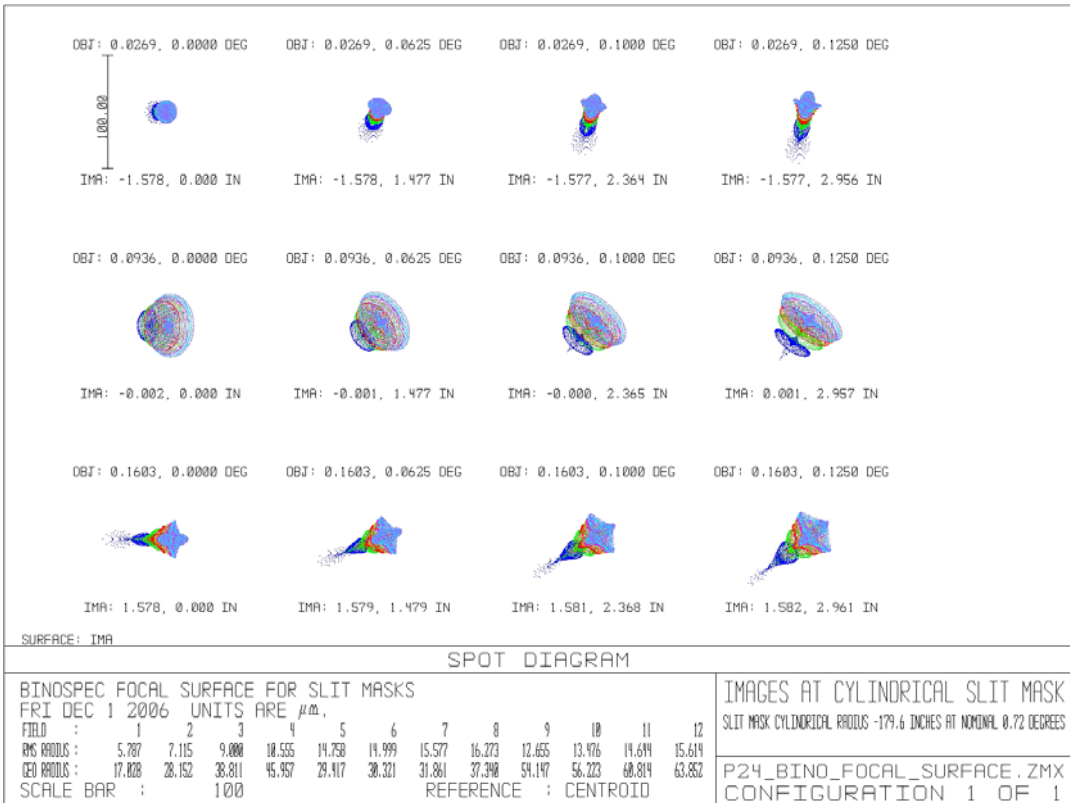


Figure 3. Images on a cylindrical focal surface with a radius of -179.6 inches, tipped at the nominal 0.72°.

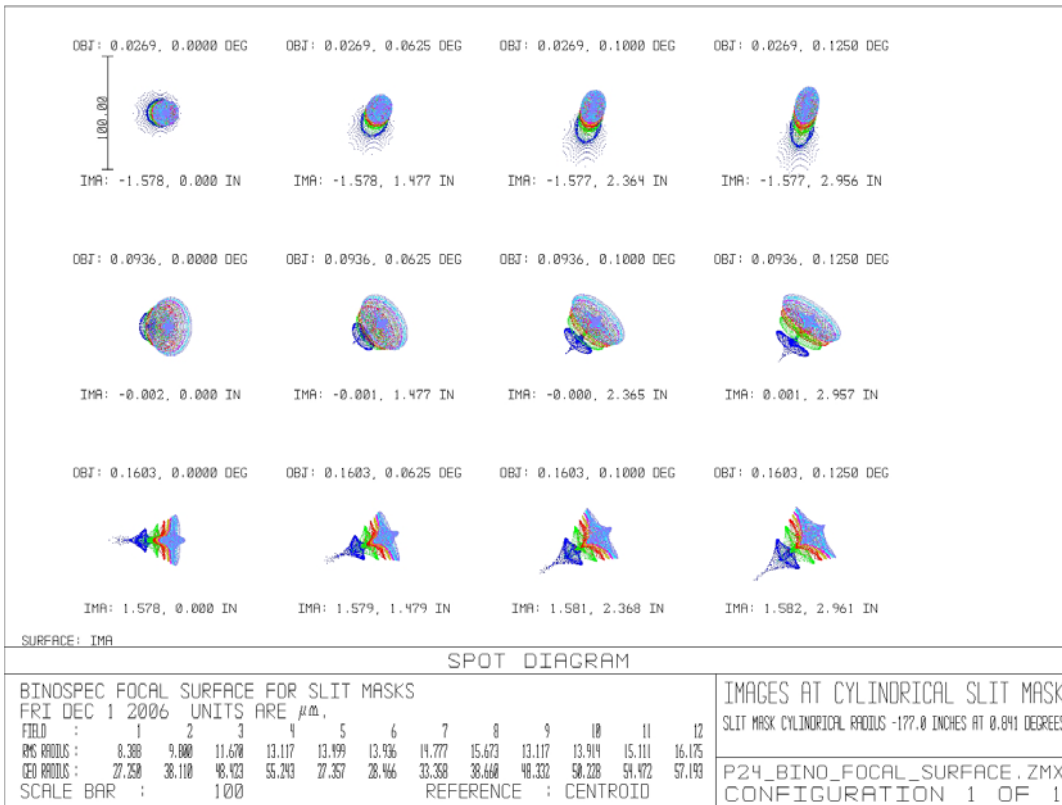


Figure 4. Images on a cylindrical slit mask with a radius of -177.0 inches tilted at 0.841°.

System/Prescription Data

File :

C:\docs\Zemax_Files\binospec\2006_reopt\p24_bino_focal_surface.ZMX

Title: Binospes focal surface for slit masks

Date : FRI DEC 1 2006

Surf	Type	Radius	Thickness	Glass	Diameter	Conic
OBJ	STANDARD	Infinity	Infinity		0	0
1	STANDARD	Infinity	245		257.6474	0
STO	STANDARD	-639.9724	-243.4901	MIRROR	256	-1
3	STANDARD	-202.7909	243.4901	MIRROR	63.62974	-2.6947
4	STANDARD	Infinity	1.156772		21.10908	0
5	STANDARD	23.80854	2.885354	SIL5C	32.73386	0
6	STANDARD	27.35535	3.152953		32.73386	0
7	STANDARD	39.86205	1.840197	SIL5C	31.37913	0
8	STANDARD	22.74866	6.742126		31.37913	0
9	STANDARD	-235.5551	1.933386	SIL5C	30.21299	0
10	STANDARD	-82.84606	2.119213		30.21299	0
11	STANDARD	Infinity	1	SFSL5Y_5C	29.48504	0
12	STANDARD	Infinity	0.005	CAF2P20	29.48504	0
13	STANDARD	Infinity	0.6	PBL6Y_5C	29.48504	0
14	STANDARD	Infinity	1.012008		29.47717	0
15	STANDARD	Infinity	0.6	PBL6Y_5C	29.48504	0
16	STANDARD	Infinity	0.005	CAF2P20	29.48504	0
17	STANDARD	Infinity	1	SFSL5Y_5C	29.48504	0
18	STANDARD	Infinity	27.54937		29.48504	0
19	STANDARD	Infinity	0.5	SIL5C	12.50874	0
20	STANDARD	Infinity	18.565		12.45614	0
21	STANDARD	-134.0157	-0.0175248		9.628889	-665
22	COORDBRK		0		-	-
IMA	TOROIDAL	-177			6.715406	0

SURFACE DATA DETAIL:

Surface OBJ : STANDARD
 Surface 1 : STANDARD
 Surface STO : STANDARD
 Mirror Substrate : Curved, Thickness = 5.12000E+000
 Surface 3 : STANDARD
 Mirror Substrate : Curved, Thickness = 1.27259E+000
 Surface 4 : STANDARD
 Surface 5 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 16.36693
 Surface 6 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 16.36693
 Surface 7 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 15.68957
 Surface 8 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 15.68957
 Surface 9 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 15.1065
 Surface 10 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 15.1065
 Surface 11 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 12 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 13 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 14 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.73858
 Surface 15 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 16 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 17 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 18 : STANDARD
 Aperture : Floating Aperture
 Maximum Radius : 14.74252
 Surface 19 : STANDARD
 Surface 20 : STANDARD
 Surface 21 : STANDARD
 Surface 22 : COORDBRK
 Decenter X : 2.214
 Decenter Y : 0
 Tilt About X : 0
 Tilt About Y : 0.841
 Tilt About Z : 0
 Order : Decenter then tilt
 Surface IMA : TOROIDAL
 Rad of rev. : 0
 Coeff on y^2 : 0
 Coeff on y^4 : 0
 Coeff on y^6 : 0
 Coeff on y^8 : 0
 Coeff on y^10 : 0
 Coeff on y^12 : 0
 Coeff on y^14 : 0

Number of terms: 0
 Maximum rad ap : 100
 Aperture : Rectangular Aperture
 X Half Width : 1.687
 Y Half Width : 4.250

GLOBAL VERTEX COORDINATES, ORIENTATIONS, AND ROTATION/OFFSET MATRICES:

Reference Surface: 2

Surf	R11	R12	R13	X
	R21	R22	R23	Y
	R31	R32	R33	Z
1	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	-2.450000000E+002
2	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	0.000000000E+000
3	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	-2.434900543E+002
4	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	0.000000000E+000
5	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	1.156771654E+000
6	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	4.042125984E+000
7	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	7.195078740E+000
8	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	9.035275591E+000
9	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	1.577740157E+001
10	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	1.771078740E+001
11	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	1.983000000E+001
12	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.083000000E+001
13	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.083500000E+001
14	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.143500000E+001
15	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000

	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.244700787E+001
16	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.304700787E+001
17	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.305200787E+001
18	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	2.405200787E+001
19	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	5.160137795E+001
20	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	5.210137795E+001
21	1.0000000000	0.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	0.0000000000	0.0000000000	1.0000000000	7.066637795E+001
22	0.9998922769	0.0000000000	0.0146776919	2.214000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	-0.0146776919	0.0000000000	0.9998922769	7.064885315E+001
23	0.9998922769	0.0000000000	0.0146776919	2.214000000E+000
	0.0000000000	1.0000000000	0.0000000000	0.000000000E+000
	-0.0146776919	0.0000000000	0.9998922769	7.064885315E+001