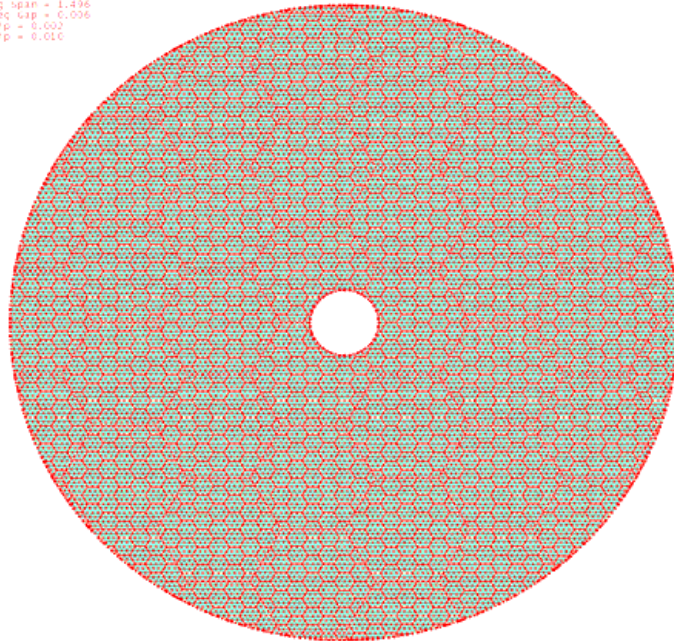




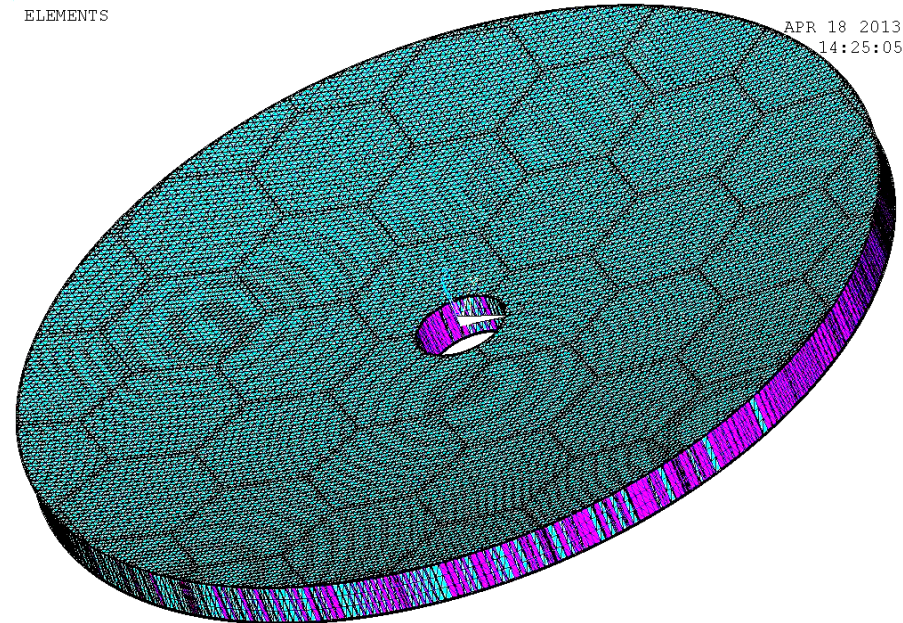
Next-generation lightweight mirror modeling software



seg span = 1.436
seg gap = 0.036
step = 0.002
tsp = 0.010



ELEMENTS



APR 18 2013
14:25:05

William R. Arnold Sr., Sr. Principal Engineer, DAI, Huntsville, AL.
Mathew Fitzgerald, NASA Intern, NASA MSFC, Huntsville, Al.
Rubin Jaca Rosa, NASA Intern, NASA MSFC, Huntsville, Al.
Dr. Phil Stahl, AMTD PI, NASA MSFC, Huntsville, Al.



INTRODUCTION

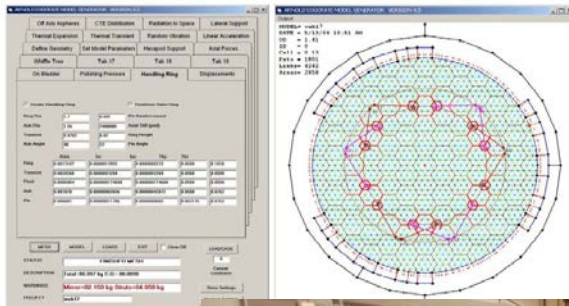


- **The modeler was developed to handle all current and projected mirror construction techniques and materials.**
- **It can be used to model both individual mirrors, arrays of mirrors and “fused segmented” mirrors**
- **It uses a new generation of algorithms and code written for Windows 7 © and beyond**
- **Designed for rapid trade studies of both gross geometry as well as detailed parameter (thickness) optimization and integrated suspension design.**

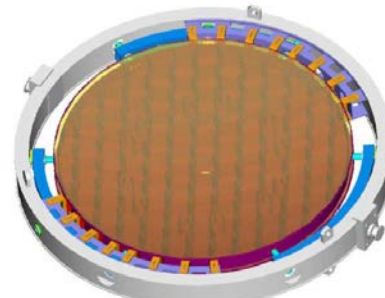
INTEGRATED APPROACH TO DESIGN WORKS (PREDECESSOR PROGRAM USED ON KEPLER)



Integrated Design of Handling Equipment



Primary Mirror in Flipping Ring



Design tool allows evaluation of the mirror blank. As mirrors manufacturing requires careful were added to the blank specific

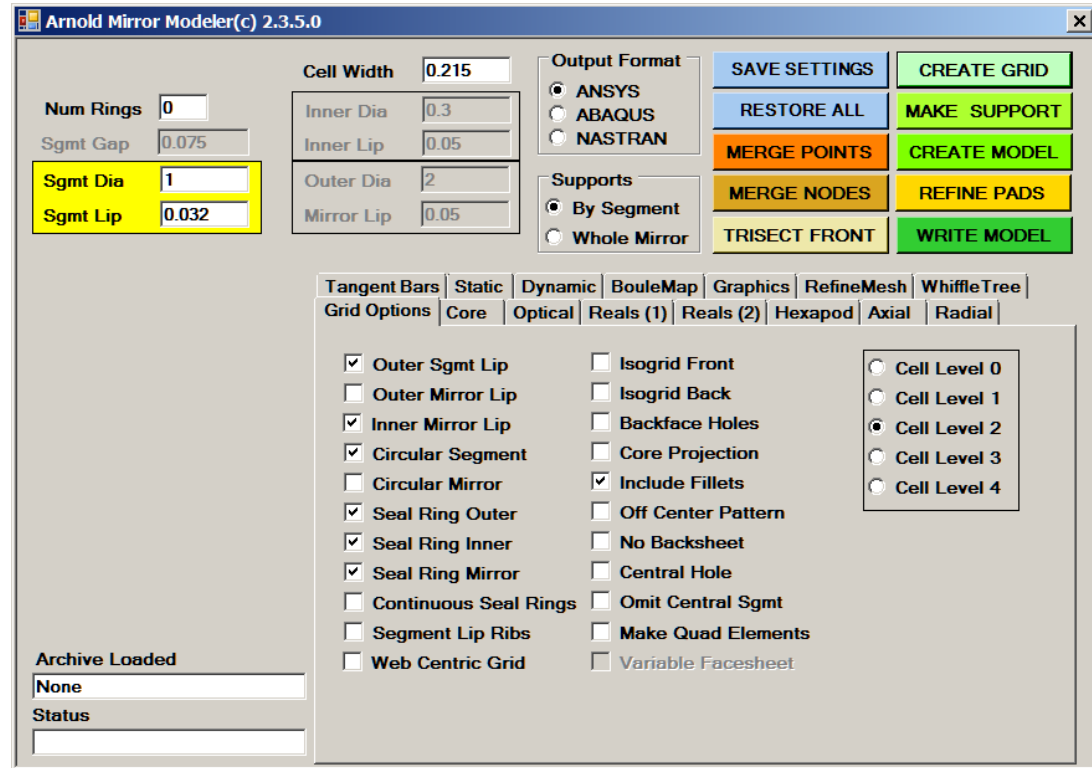
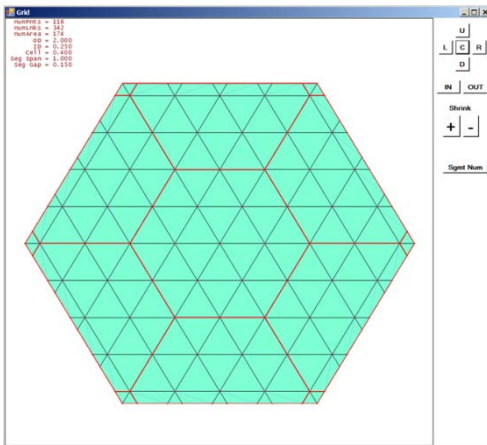
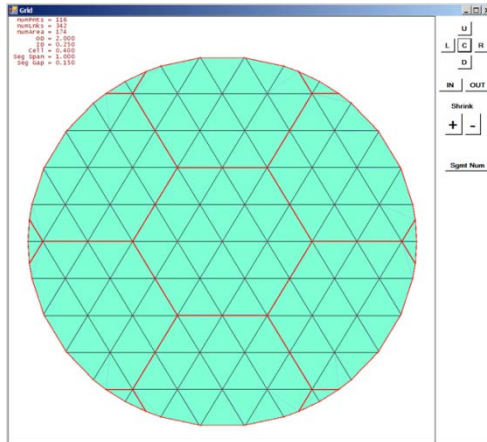


reinforced slots in the mirror the unit can act as a all surfaces or fragile edges.

2004

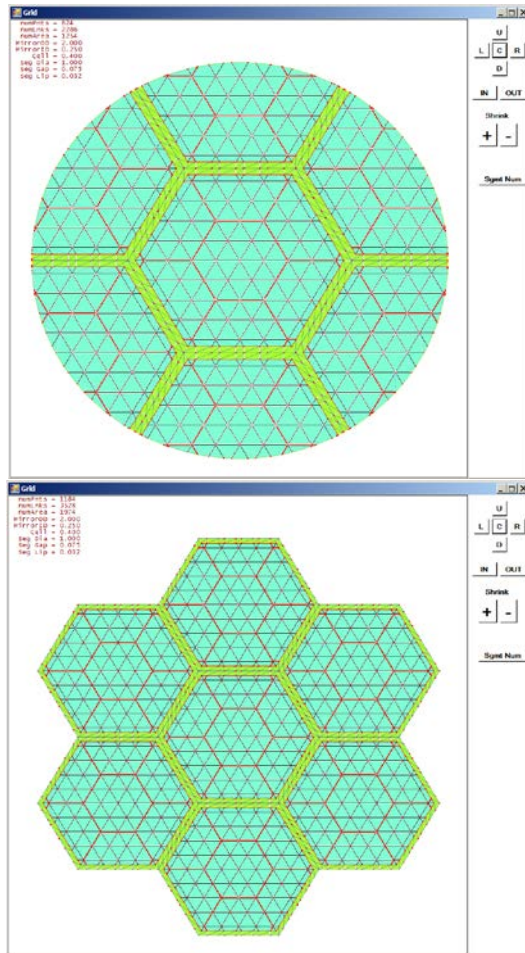
18

WIDE VARIETY OF OPTIONS TO MODEL ALMOST ANY MIRROR STYLE



SIMPLE SINGLE BLANK MIRRORS

WIDE VARIETY OF OPTIONS TO MODEL ALMOST ANY MIRROR STYLE



Arnold Mirror Modeler(c) 2.3.5.0

Cell Width: 0.215

Output Format: ANSYS, ABAQUS, NASTRAN

SAVE SETTINGS, RESTORE ALL, MERGE POINTS, MERGE NODES, TRISECT FRONT, CREATE GRID, MAKE SUPPORT, CREATE MODEL, REFINE PADS, WRITE MODEL

Num Rings: 1, Sgmt Gap: 0.075, Sgmt Span: 1, Sgmt Lip: 0.032

Inner Dia: 0.3, Inner Lip: 0.05, Outer Dia: 2, Mirror Lip: 0.05

Supports: By Segment, Whole Mirror

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree | Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Outer Sgmt Lip, Outer Mirror Lip, Inner Mirror Lip, Circular Segment, Circular Mirror, Seal Ring Outer, Seal Ring Inner, Seal Ring Mirror, Continuous Seal Rings, Segment Lip Ribs, Web Centric Grid

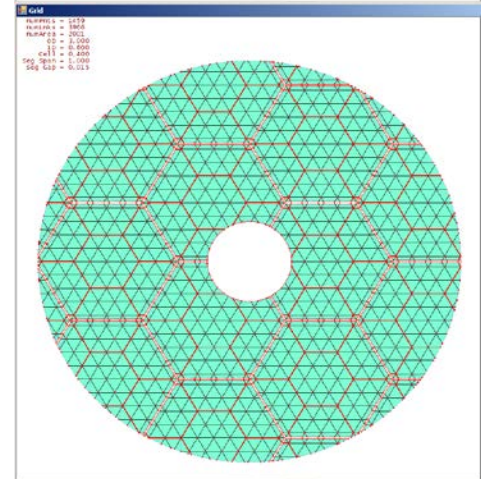
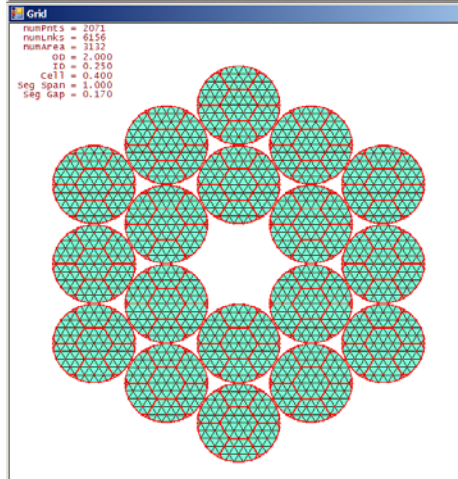
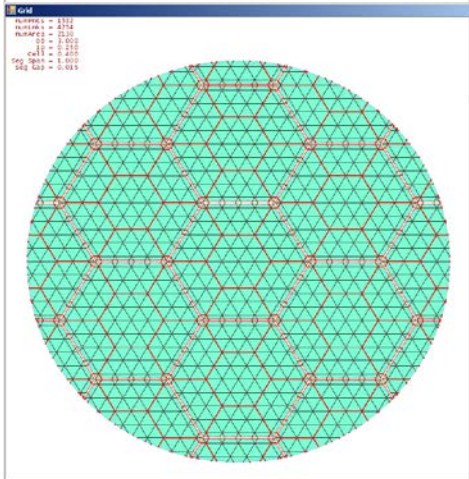
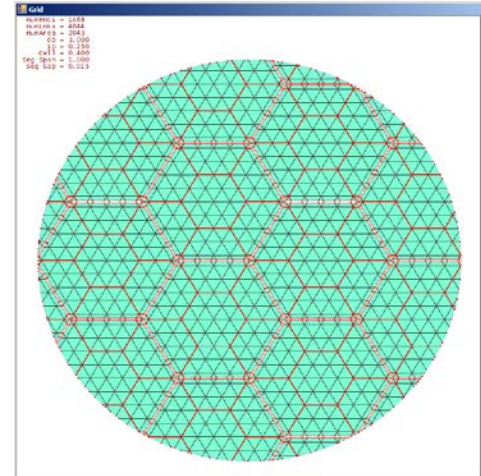
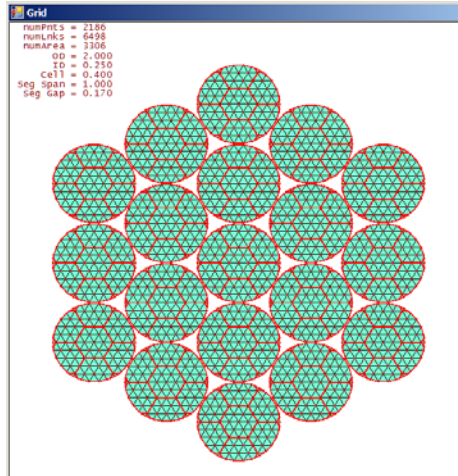
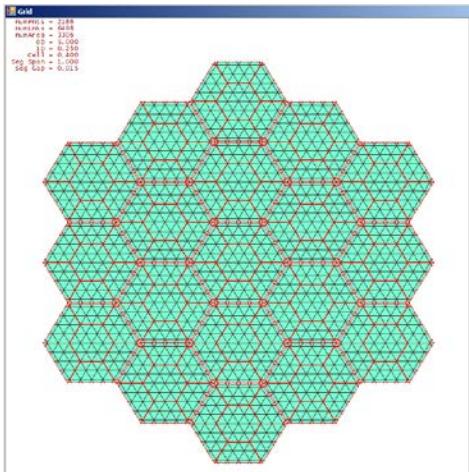
Isogrid Front, Isogrid Back, Backface Holes, Core Projection, Include Fillets, Off Center Pattern, No Backsheet, Central Hole, Omit Central Sgmt, Make Quad Elements, Variable Facesheet

Cell Level 0, Cell Level 1, Cell Level 2, Cell Level 3, Cell Level 4

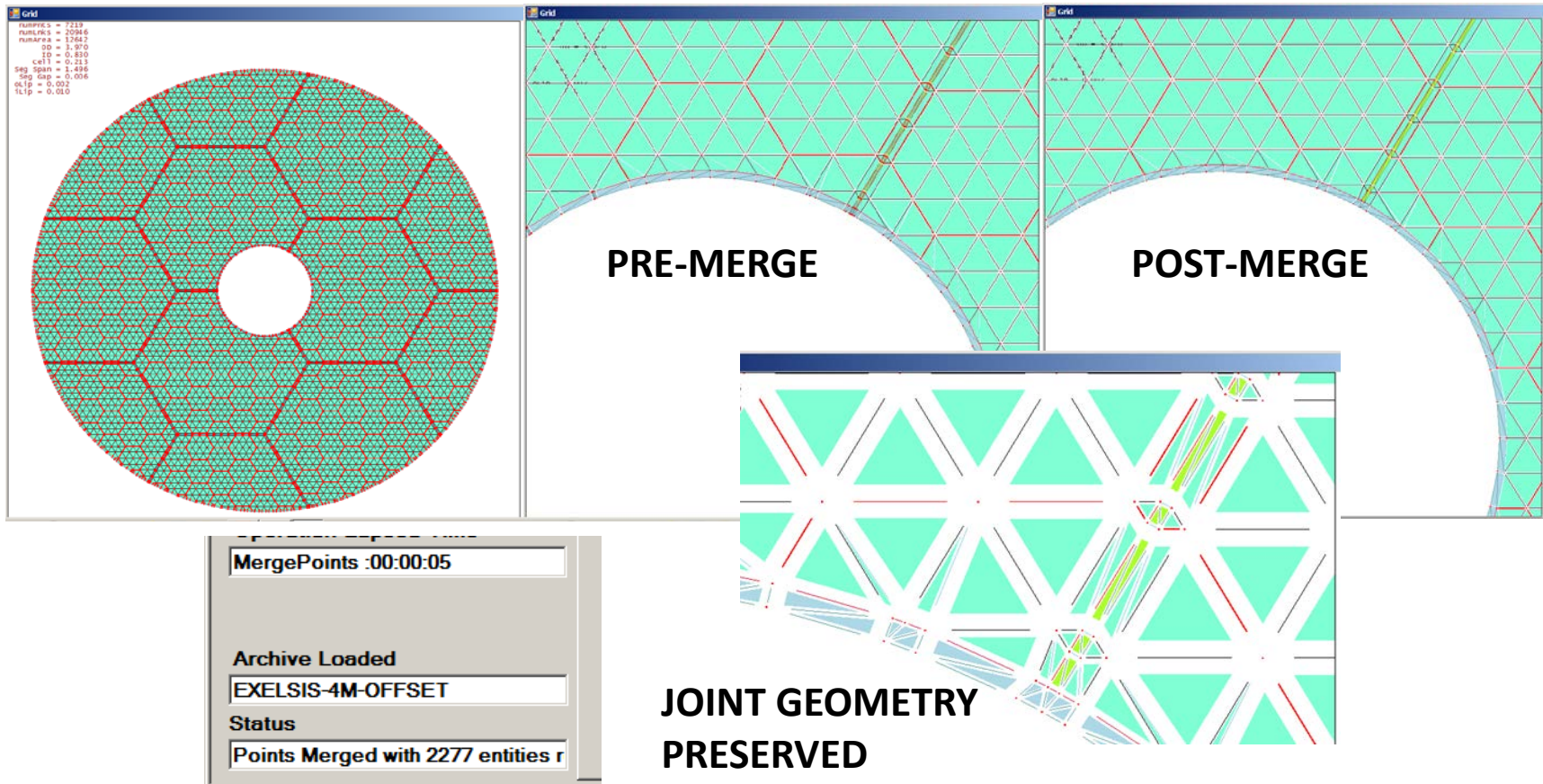
Archive Loaded: None
Status: Starting Segment = 1 of 1

MULTIPLE SEGMENT MIRRORS

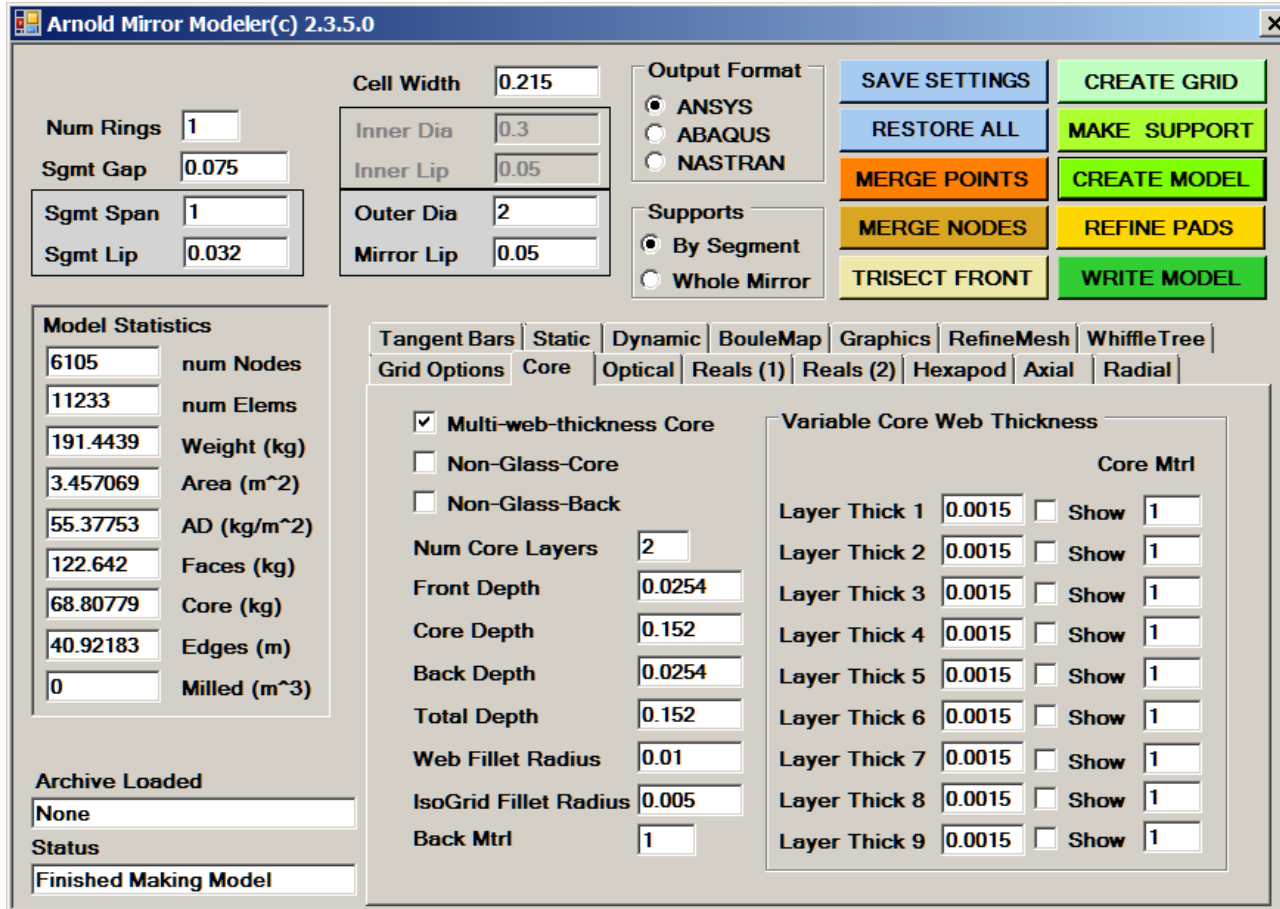
MANY CONFIGURATION OPTIONS ARE AVAILABLE



COMPLEX SEGMENTED ASSEMBLIES CAN BE MERGED INTO A SINGLE STRUCTURE



CORE WEB THICKNESSES CAN BE VARIED THRU DEPTH



Arnold Mirror Modeler(c) 2.3.5.0

Cell Width: 0.215

Output Format: ANSYS, ABAQUS, NASTRAN

Supports: By Segment, Whole Mirror

SAVE SETTINGS, RESTORE ALL, MERGE POINTS, MERGE NODES, TRISECT FRONT, CREATE GRID, MAKE SUPPORT, CREATE MODEL, REFINE PADS, WRITE MODEL

Num Rings: 1, Sgmt Gap: 0.075, Sgmt Span: 1, Sgmt Lip: 0.032

Inner Dia: 0.3, Inner Lip: 0.05, Outer Dia: 2, Mirror Lip: 0.05

Model Statistics

6105	num Nodes
11233	num Elems
191.4439	Weight (kg)
3.457069	Area (m ²)
55.37753	AD (kg/m ²)
122.642	Faces (kg)
68.80779	Core (kg)
40.92183	Edges (m)
0	Milled (m ³)

Archive Loaded: None, Status: Finished Making Model

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree | Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Multi-web-thickness Core, Non-Glass-Core, Non-Glass-Back

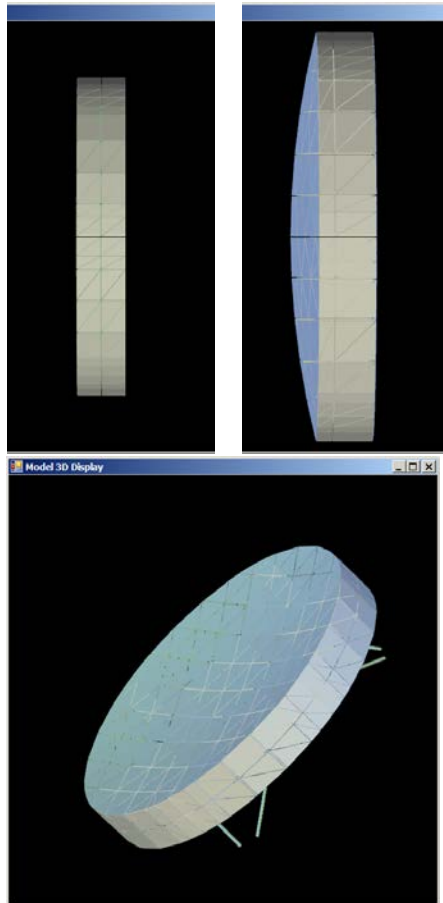
Num Core Layers: 2, Front Depth: 0.0254, Core Depth: 0.152, Back Depth: 0.0254, Total Depth: 0.152, Web Fillet Radius: 0.01, IsoGrid Fillet Radius: 0.005, Back Mtrl: 1

Variable Core Web Thickness

Layer Thick	Core Mtrl
Layer Thick 1: 0.0015	Show 1
Layer Thick 2: 0.0015	Show 1
Layer Thick 3: 0.0015	Show 1
Layer Thick 4: 0.0015	Show 1
Layer Thick 5: 0.0015	Show 1
Layer Thick 6: 0.0015	Show 1
Layer Thick 7: 0.0015	Show 1
Layer Thick 8: 0.0015	Show 1
Layer Thick 9: 0.0015	Show 1

MODEL STATISTICS AVAILABLE ONCE CREATE MODEL FINISHES

MIRROR OPTICAL PRESCRIPTION FLATS, PRIMARY & SECONDARIES



Arnold Mirror Modeler(c) 2.3.5.0

Num Rings	1	Cell Width	0.215	Output Format	<input checked="" type="radio"/> ANSYS <input type="radio"/> ABAQUS <input type="radio"/> NASTRAN	SAVE SETTINGS	CREATE GRID
Sgmt Gap	0.075	Inner Dia	0.3	Supports	<input checked="" type="radio"/> By Segment <input type="radio"/> Whole Mirror	RESTORE ALL	MAKE SUPPORT
Sgmt Span	1	Inner Lip	0.05			MERGE POINTS	CREATE MODEL
Sgmt Lip	0.032	Outer Dia	2			MERGE NODES	REFINE PADS
		Mirror Lip	0.05			TRISECT FRONT	WRITE MODEL

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree |
 Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Radius	2	<input checked="" type="checkbox"/> Flat Mirror
Conic	-1	<input type="checkbox"/> Flat Backed Mirror
Aspheric Order	0	<input type="checkbox"/> Convex Mirror
Coefficient(1)	0	
Coefficient(2)	0	
Coefficient(3)	0	
Coefficient(4)	0	
Coefficient(5)	0	

Archive Loaded
 None
 Status
 Starting Segment = 7 of 7

INITIAL ELEMENT THICKNESS & MIRROR MATERIAL OPTIONS

Arnold Mirror Modeler(c) 2.3.5.0

Cell Width: 0.215

Output Format: ANSYS, ABAQUS, NASTRAN

Supports: By Segment, Whole Mirror

SAVE SETTINGS, RESTORE ALL, MERGE POINTS, MERGE NODES, TRISECT FRONT, CREATE GRID, MAKE SUPPORT, CREATE MODEL, REFINE PADS, WRITE MODEL

Num Rings: 1, Sgmt Gap: 0.075, Sgmt Span: 1, Sgmt Lip: 0.032

Inner Dia: 0.3, Inner Lip: 0.05, Outer Dia: 2, Mirror Lip: 0.05

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree | Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Ring	Thickness	Feature	Show
r, 1	0.005	Front Facesheet	<input type="checkbox"/>
r, 2	0.005	Back Facesheet	<input checked="" type="checkbox"/>
r, 3	0.005	Front IsoGrid Web	<input type="checkbox"/>
r, 4	0.005	Segment Outer Seal	<input type="checkbox"/>
r, 5	0.005	Inner Seal Ring	<input type="checkbox"/>
r, 6	0.005	Core Web	<input checked="" type="checkbox"/>
r, 7	0.005	Back IsoGrid Web	<input type="checkbox"/>
r, 8	0.015	Front Outer Seg Lip	<input type="checkbox"/>
r, 9	0.015	Back Outer Seg Lip	<input type="checkbox"/>
r, 10	0.015	Isogrid Fillet Front	<input type="checkbox"/>
r, 11	0.015	Isogrid Fillet Back	<input type="checkbox"/>
r, 12	0.015	Mirror Outer Seal	<input type="checkbox"/>

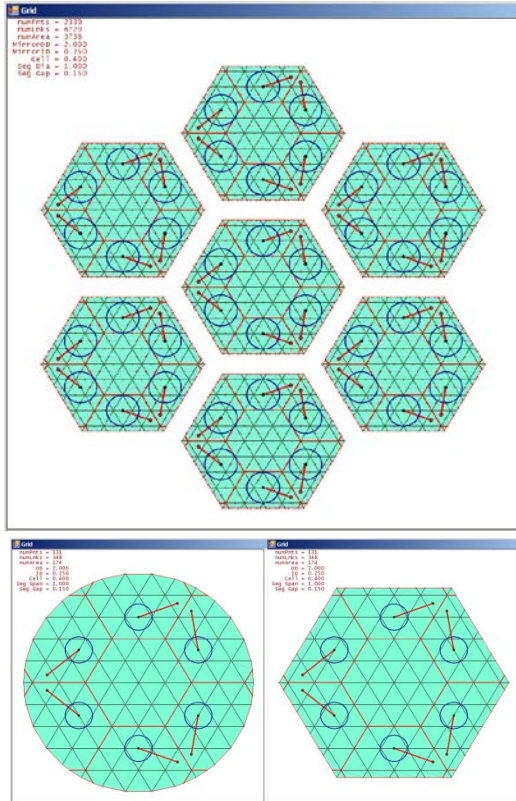
Mirror Material: ULE, Zerodur, E6, Fused Silica, BK7, Silicon Carbide

Archive Loaded: None, Status: Starting Segment = 7 of 7

ALL SETTINGS CAN BE ARCHIVED AND RETRIEVED

INPUT DECKS CAN BE GENERATED FOR ANSYS, ABAQUS or NASTRAN

HEXAPOD STYLE SUSPENSION PER SEGMENT OR WHOLE MIRROR



Arnold Mirror Modeler(c) 2.3.5.0

Cell Width 0.215

Output Format
 ANSYS
 ABAQUS
 NASTRAN

SAVE SETTINGS **CREATE GRID**
RESTORE ALL **MAKE SUPPORT**
MERGE POINTS **CREATE MODEL**
MERGE NODES **REFINE PADS**
TRISECT FRONT **WRITE MODEL**

Num Rings 1
Sgmt Gap 0.075
Sgmt Span 1
Sgmt Lip 0.032

Inner Dia 0.3
Inner Lip 0.05
Outer Dia 2
Mirror Lip 0.05

Supports
 By Segment
 Whole Mirror

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree
Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Upper Diameter 0.6 (m) Do Hexapod
Lower Diameter 0.8 (m) Do Hexapod Pad
Height (ground) 0.25 (m) Three Pads Only
Start Angle 0 (deg)
Upper Spread 30 (deg)
Lower Spread 5 (deg)
Acceptable Near 1E-05 (m)
Spring Rate 200000 (N/m)
Fitting Mass 1 (kg)
Pad Diameter 0.21 (m)
Perimeter Dia 0.315 (m)

Archive Loaded
None
Status
Starting Segment = 7 of 7

AXIAL STYLE SUSPENSION PER SEGMENT OR WHOLE MIRROR

Arnold Mirror Modeler(c) 2.3.5.0

Cell Width: 0.215

Output Format: ANSYS, ABAQUS, NASTRAN

Supports: By Segment, Whole Mirror

Buttons: SAVE SETTINGS, RESTORE ALL, MERGE POINTS, MERGE NODES, TRISECT FRONT, CREATE GRID, MAKE SUPPORT, CREATE MODEL, REFINE PADS, WRITE MODEL

Num Rings: 1, Sgmt Gap: 0.075, Sgmt Span: 1, Sgmt Lip: 0.032

Inner Dia: 0.3, Inner Lip: 0.05, Outer Dia: 2, Mirror Lip: 0.05

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree | Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

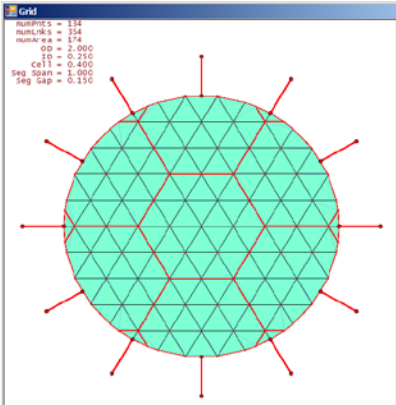
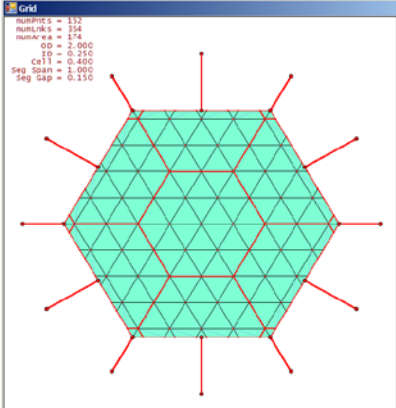
Do Axial Support
 Do Axial Pads

Pnts	Diameter (m)	Start Ang (deg)	Spring Rate (N/m)
2	0.6	30	20000
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Fitting Mass: 1 (kg)
Support Ground: 0.25 (m)
Acceptable Near: 1E-05 (m)
Pad Diameter: 0.25 (m)
Axial Perimeter Dia: 0.375 (m)

Archive Loaded: None
Status: Starting Segment = 7 of 7

RADIAL STYLE SUSPENSION PER SEGMENT OR WHOLE MIRROR

Arnold Mirror Modeler(c) 2.3.5.0

Num Rings: <input type="text" value="1"/> Sgmt Gap: <input type="text" value="0.075"/> Sgmt Span: <input type="text" value="1"/> Sgmt Lip: <input type="text" value="0.032"/>	Cell Width: <input type="text" value="0.215"/> Inner Dia: <input type="text" value="0.3"/> Inner Lip: <input type="text" value="0.05"/> Outer Dia: <input type="text" value="2"/> Mirror Lip: <input type="text" value="0.05"/>	Output Format <input checked="" type="radio"/> ANSYS <input type="radio"/> ABAQUS <input type="radio"/> NASTRAN	<input type="button" value="SAVE SETTINGS"/> <input type="button" value="CREATE GRID"/> <input type="button" value="RESTORE ALL"/> <input type="button" value="MAKE SUPPORT"/> <input type="button" value="MERGE POINTS"/> <input type="button" value="CREATE MODEL"/> <input type="button" value="MERGE NODES"/> <input type="button" value="REFINE PADS"/> <input type="button" value="TRISECT FRONT"/> <input type="button" value="WRITE MODEL"/>
--	---	---	--

Supports
 By Segment
 Whole Mirror

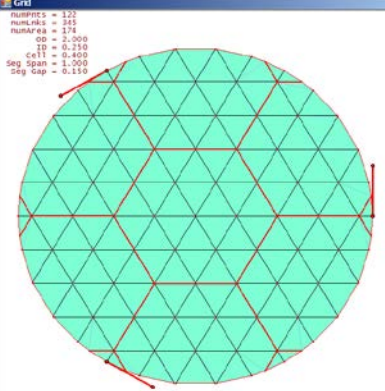
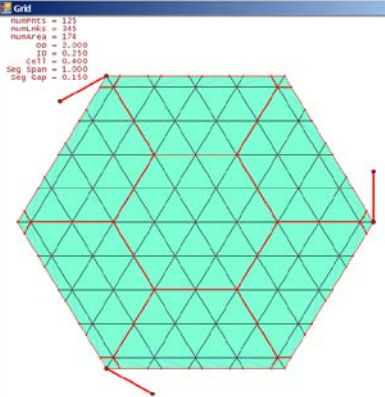
Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree |
 Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Do Radial Support

Num Points:
 Support Length: (m)
 Spring Rate: (N/m)
 Start Angle: (deg)
 Fitting Mass: (kg)
 Acceptable Near: (m)

Archive Loaded:
 Status:

TANGENT BAR SUSPENSION PER SEGMENT OR WHOLE MIRROR

Arnold Mirror Modeler(c) 2.3.5.0

<p>Cell Width: 0.215</p> <p>Num Rings: 1</p> <p>Sgmt Gap: 0.075</p> <p>Sgmt Span: 1</p> <p>Sgmt Lip: 0.032</p>	<p>Inner Dia: 0.3</p> <p>Inner Lip: 0.05</p> <p>Outer Dia: 2</p> <p>Mirror Lip: 0.05</p>	<p>Output Format</p> <p><input checked="" type="radio"/> ANSYS</p> <p><input type="radio"/> ABAQUS</p> <p><input type="radio"/> NASTRAN</p> <p>Supports</p> <p><input checked="" type="radio"/> By Segment</p> <p><input type="radio"/> Whole Mirror</p>	<p>SAVE SETTINGS</p> <p>RESTORE ALL</p> <p>MERGE POINTS</p> <p>MERGE NODES</p> <p>TRISECT FRONT</p> <p>CREATE GRID</p> <p>MAKE SUPPORT</p> <p>CREATE MODEL</p> <p>REFINE PADS</p> <p>WRITE MODEL</p>
--	--	--	--

Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial

Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree

Do Tangent Bars

Number of Tangent Bars: 3

Tangent Bar Start Angle: 0

Tangent Bar Length: 0.15

Tangent Bar Spring Rate: 20000

Tangent Fitting Mass: 1 (kg)

Archive Loaded: None

Status: Starting Segment = 7 of 7

WHIFFLE TREE SUPPORTS CURRENTLY UNDER DEVELOPMENT

The screenshot displays the Arnold Mirror Modeler(c) 2.3.5.0 software interface. The main window shows a circular grid with a central white area and a green whiffle tree support structure. The interface includes a 'Grid' panel on the left with the following data:

numPnts =	926
numLnks =	2547
numArea =	1416
Cell =	0.400
Sgmt Dia =	1.000
Seg Gap =	0.075
Seg Lip =	0.032
MirrorOD =	2.000
MirrorID =	0.100
InnerLip =	0.500
InnerLip =	0.050

The main control panel includes the following settings:

- Cell Width: 0.215
- Num Rings: 1
- Inner Dia: 0.3
- Lip: 0.05
- Dia: 2
- Lip: 0.05

The 'Output Format' section has radio buttons for ANSYS (selected), ABAQUS, and NASTRAN. The 'Supports' section has radio buttons for 'By Segment' (selected) and 'Whole Mirror'. A 'Do Whiffle Tree' checkbox is present and unchecked.

The 'Number of Pads' section has radio buttons for 3, 6, 9, 12, 18 (2x3), 18 (3x2), 24, 27, 36, 54, and 81. The '3' option is selected.

The 'Level' settings table is as follows:

Level	Diameter	Start Angle	Arm Ratio
Level 1	0.5	0	1
Level 2	0.25	0	1
Level 3	0.15	0	1
Level 4	0.05	0	1

The 'Pad Dia' is set to 0.125.

A yellow banner at the bottom of the interface reads **UNDER CONSTRUCTION**.

YOU CAN DEFINE LOAD CASES

STATIC, MODAL & PSD

The image shows two side-by-side screenshots of the Arnold Mirror Modeler (c) 2.3.5.0 software interface. The left screenshot shows the 'Static' analysis options, and the right screenshot shows the 'Modal' analysis options.

Static Analysis Options (Left Screenshot):

- Grid Options: Core, Optical, Reals (1), Reals (2), Hexapod, Axial, Radial
- Tangent Bars: Static, Dynamic, BouleMap, Graphics, RefineMesh, WhiffleTree
- Accelerations: Accel X, Accel Y, Accel Z (all set to 0)
- Calculate Static LCs: num Loadcases = 0
- Fix Back Facesheet: (Note: Use with AccelZ = 1 for gravity sag studies)

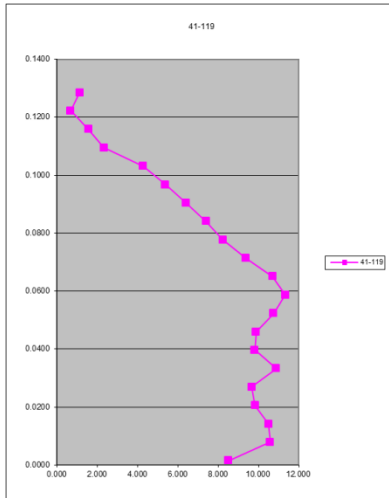
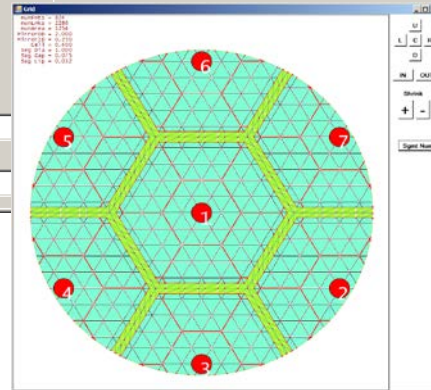
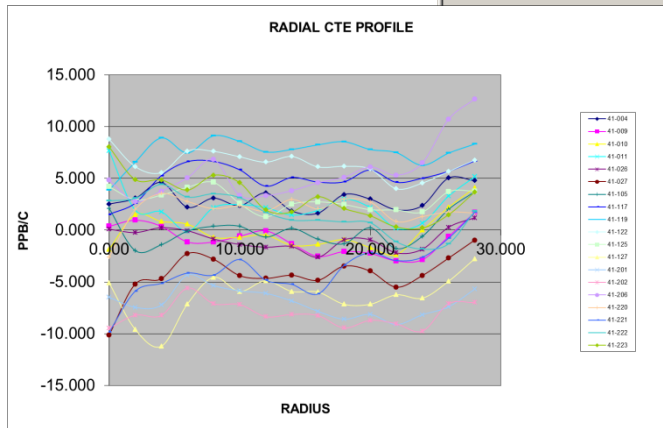
Modal Analysis Options (Right Screenshot):

- Calculate Modes: num Modes = 16
- Calculate X PSD: f1-f7, g2 (all set to 0)
- Calculate Y PSD: f1-f7, g2 (all set to 0)
- Calculate Z PSD: f1-f7, g2 (all set to 0)

Both screenshots show common parameters: Cell Width (0.215), Num Rings (1), Sgmt Gap (0.075), Sgmt Span (1), Sgmt Lip (0.032), Inner Dia (0.3), Inner Lip (0.05), Outer Dia (2), and Mirror Lip (0.05). Output format options include ANSYS, ABAQUS, and NASTRAN. Buttons for 'SAVE SETTINGS', 'RESTORE ALL', 'MERGE POINTS', 'MERGE NODES', 'TRISECT FRONT', 'CREATE GRID', 'MAKE SUPPORT', 'CREATE MODEL', 'REFINE PADS', and 'WRITE MODEL' are visible.

- ANSYS: GENERATES ANALYSIS STREAM COMPLETE WITH PLOTS AND RESULT FILES
- ABAQUS: GENERATES ANALYSIS STREAM, USES ABAQUS/CAE PYTHON SCRIPT FOR PLOTS & RESULTS
- NASTRAN: GENERATES ANALYSIS STREAM, USES FEMAP OR PATRAN FOR PLOTS & RESULTS

IF ULE[®] BOULE CTE DATA AVAILABLE IT CAN BE MAPPED ONTO THE MODEL

**SEGMENT ID CAN
BE SHOWN ON
GRID**

GRID PLOTTING OPTIONS

Arnold Mirror Modeler(c) 2.3.5.0

Grid Options | Core | Optical | Reals (1) | Reals (2) | Hexapod | Axial | Radial | Tangent Bars | Static | Dynamic | BouleMap | Graphics | RefineMesh | WhiffleTree

Show Supports Grid Zoom: 1
 Show Fillets Sink Factor: 0.05
 Show Simplified Grid

Allow Mouse for GridPlot (Zoom & Pan)
 Allow Mouse for ModelPlot (Zoom Only)

TooNear Tolerance: 0.0001 (internal auto merge)

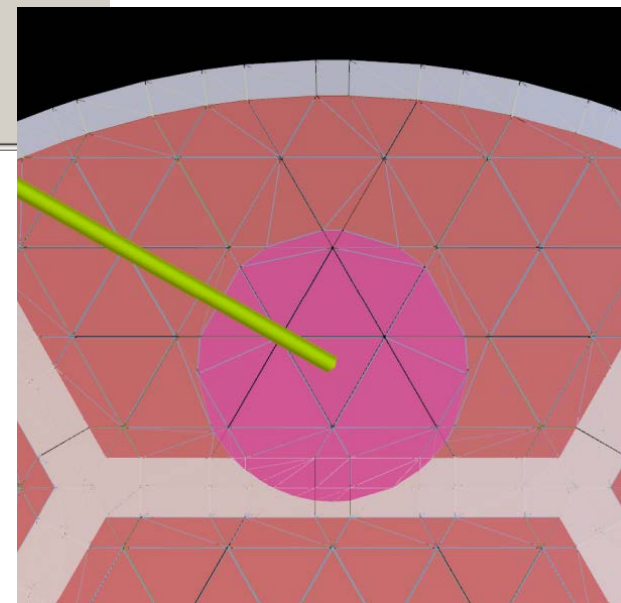
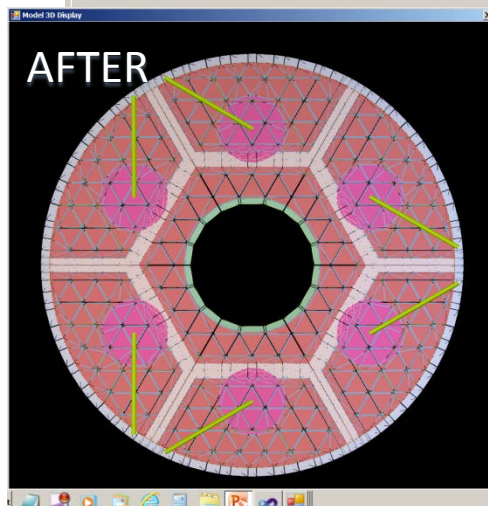
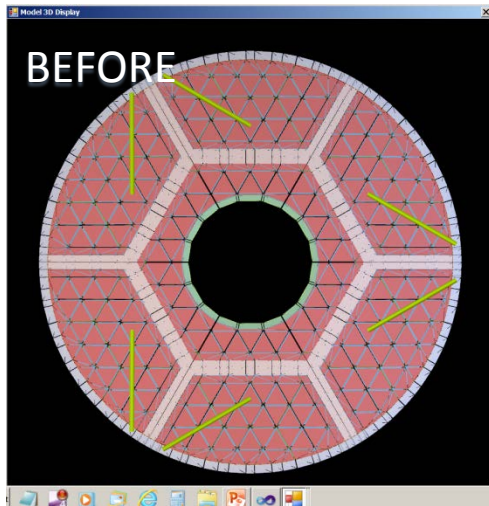
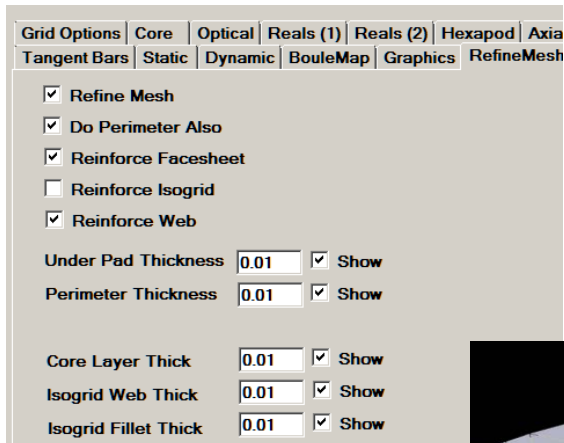
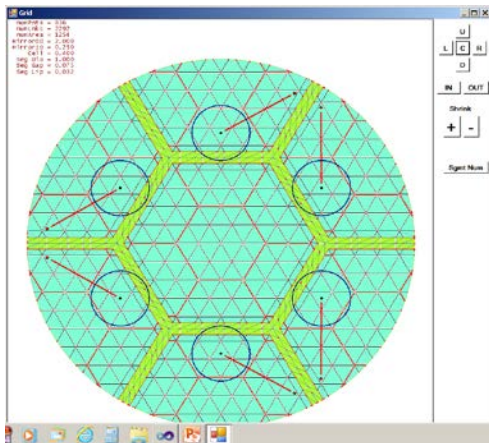
Archive Loaded: None
 Status:

Output Format: ANSYS ABAQUS NASTRAN
 By Segment Whole Mirror

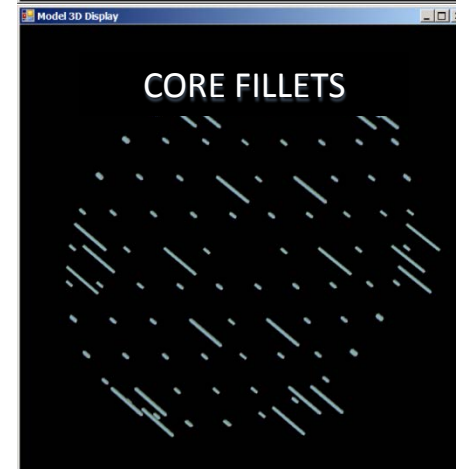
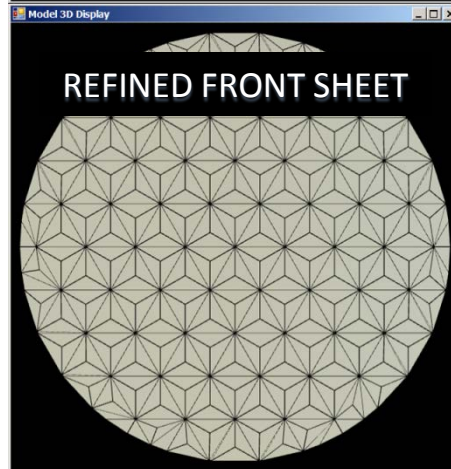
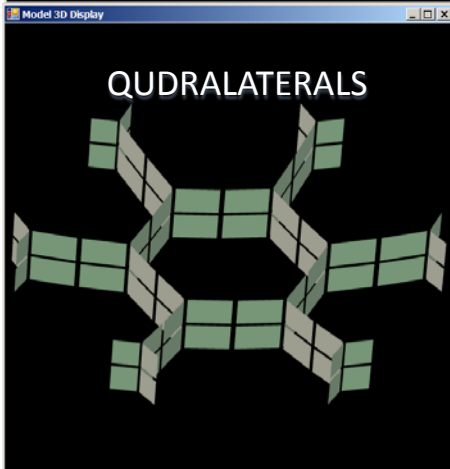
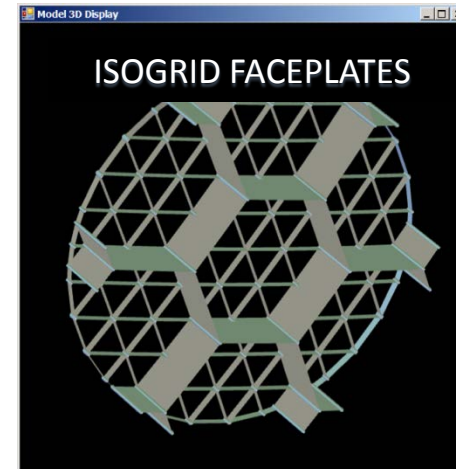
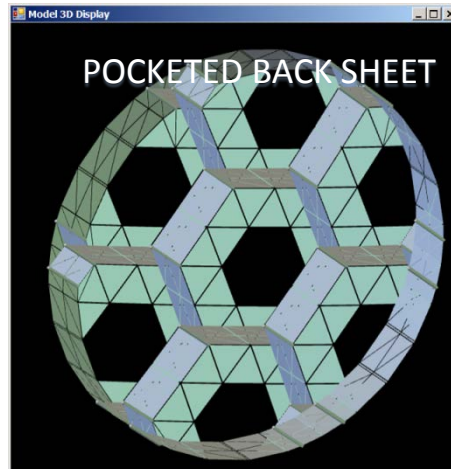
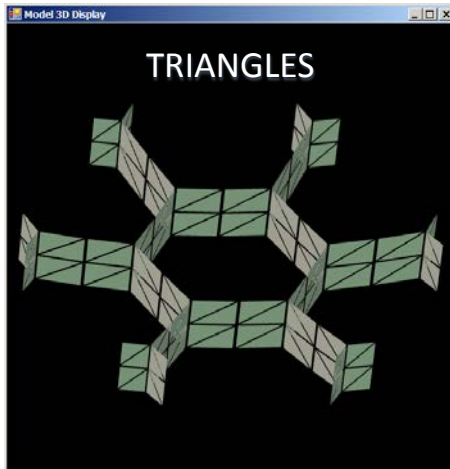
SAVE SETTINGS CREATE GRID
 RESTORE ALL MAKE SUPPORT
 MERGE POINTS CREATE MODEL
 MERGE NODES REFINE PADS
 TRISECT FRONT WRITE MODEL

SIMPLIFIED MESH, PAN & ZOOM, ELEMENT SHRINK

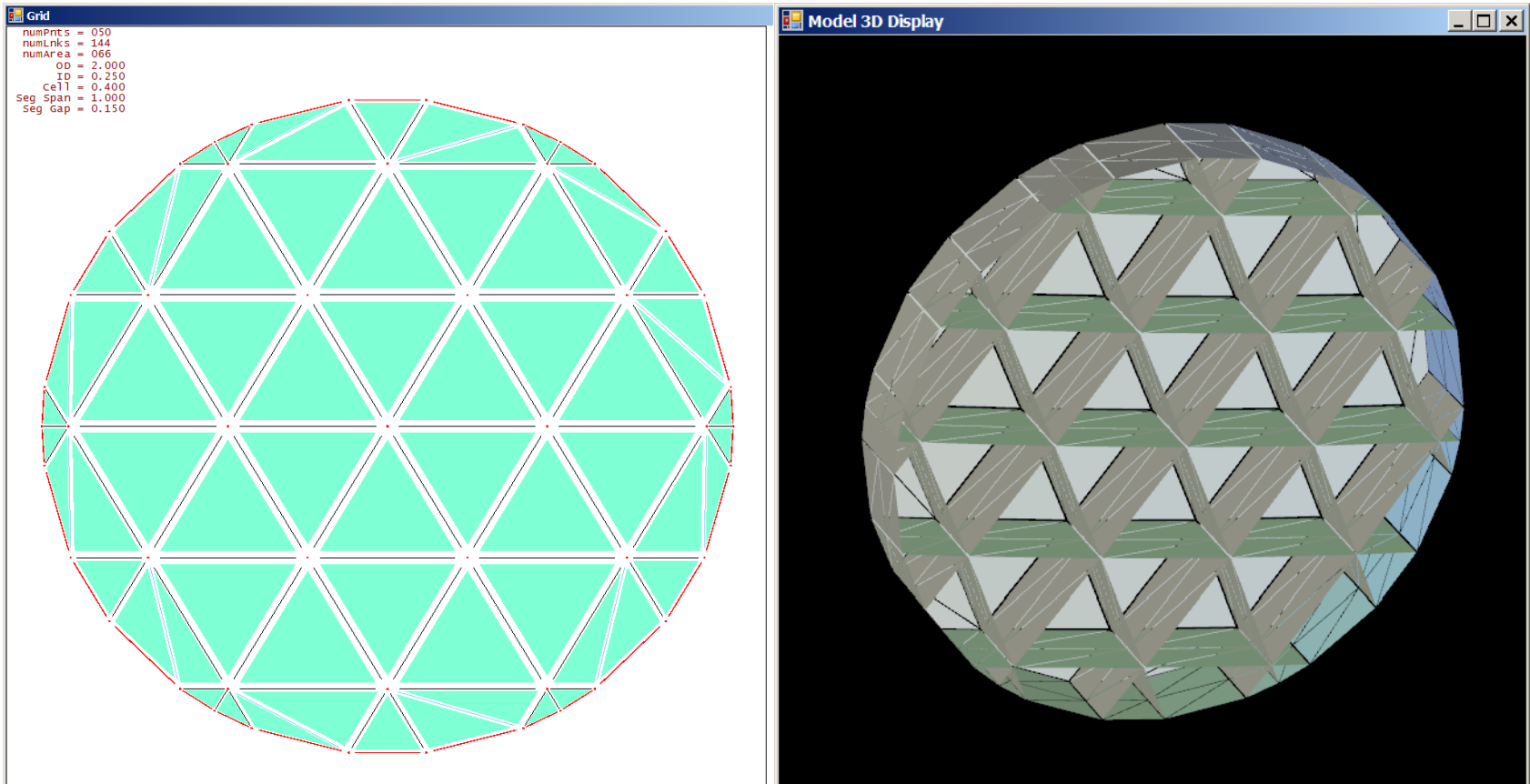
LOCALIZED MESH REFINEMENT UNDER SUPPORT PADS



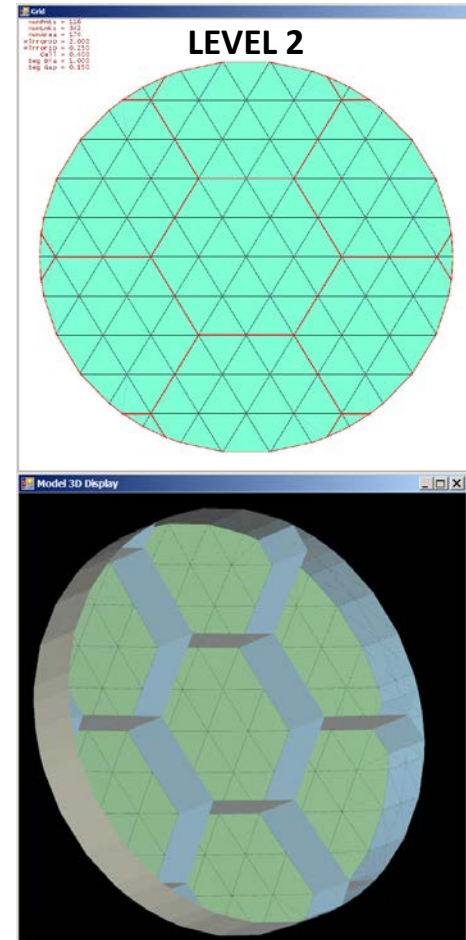
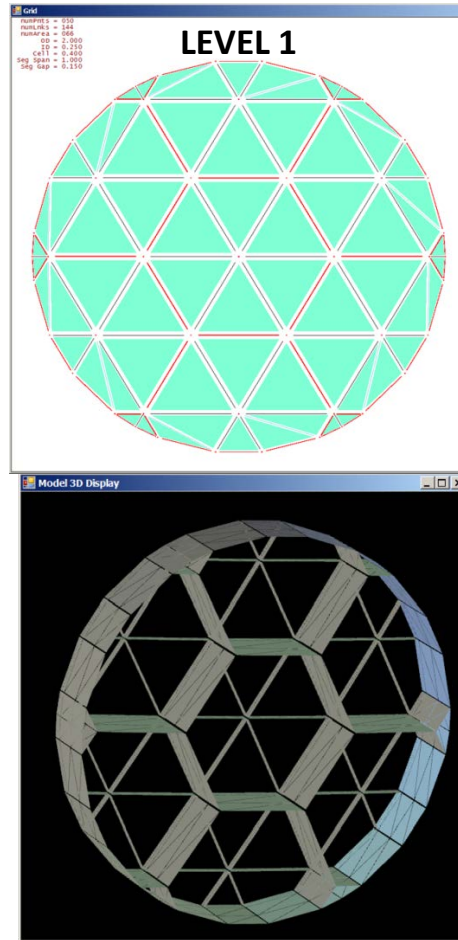
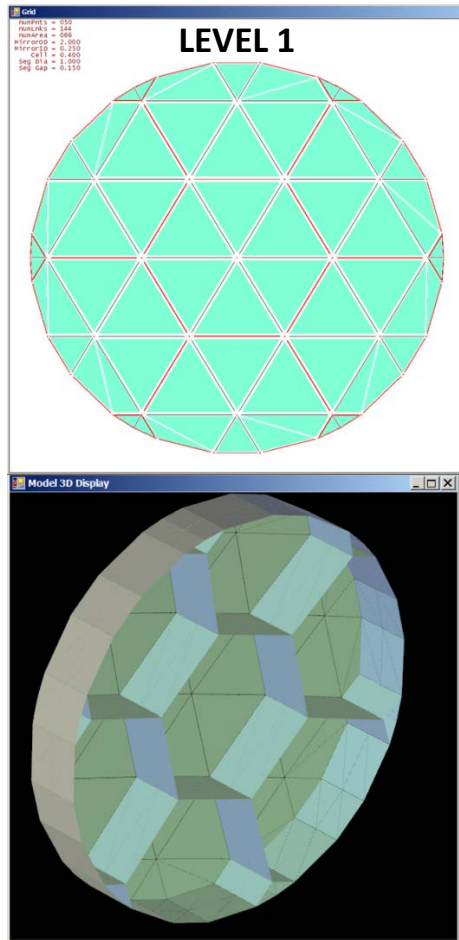
A LOT OF MESHING OPTIONS AVAILABLE



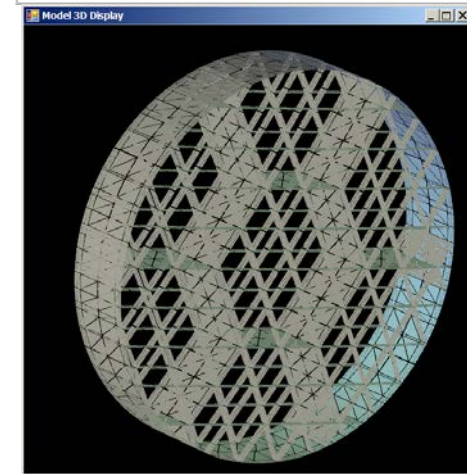
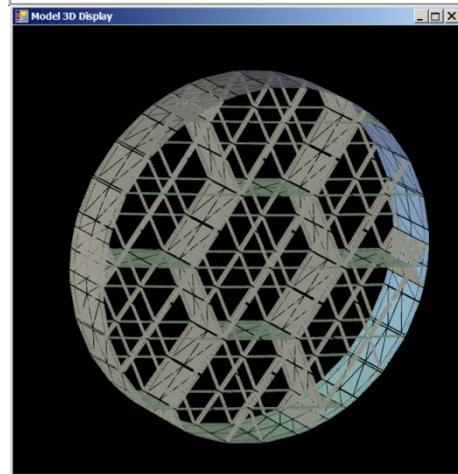
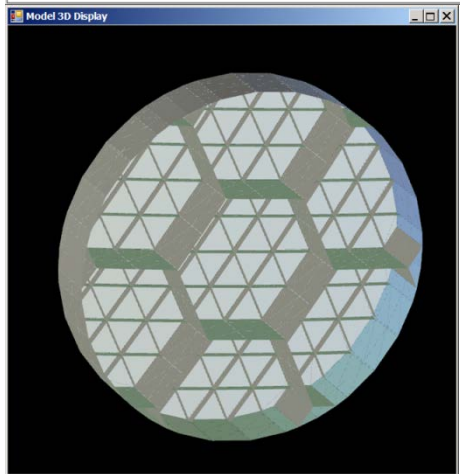
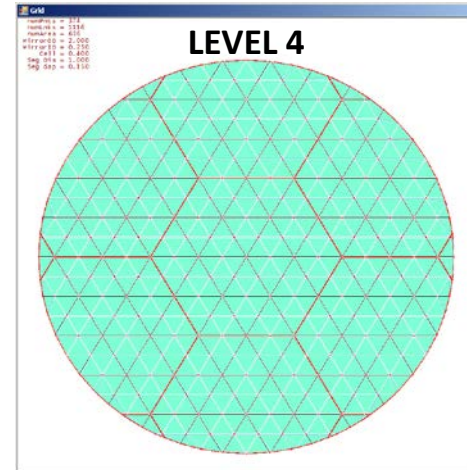
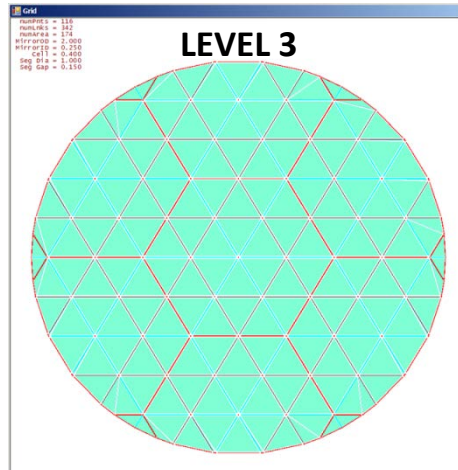
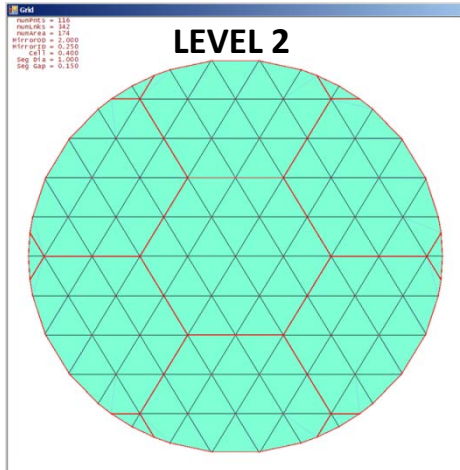
CAN MODEL A PURE ISOGRID CORE [LEVEL0]



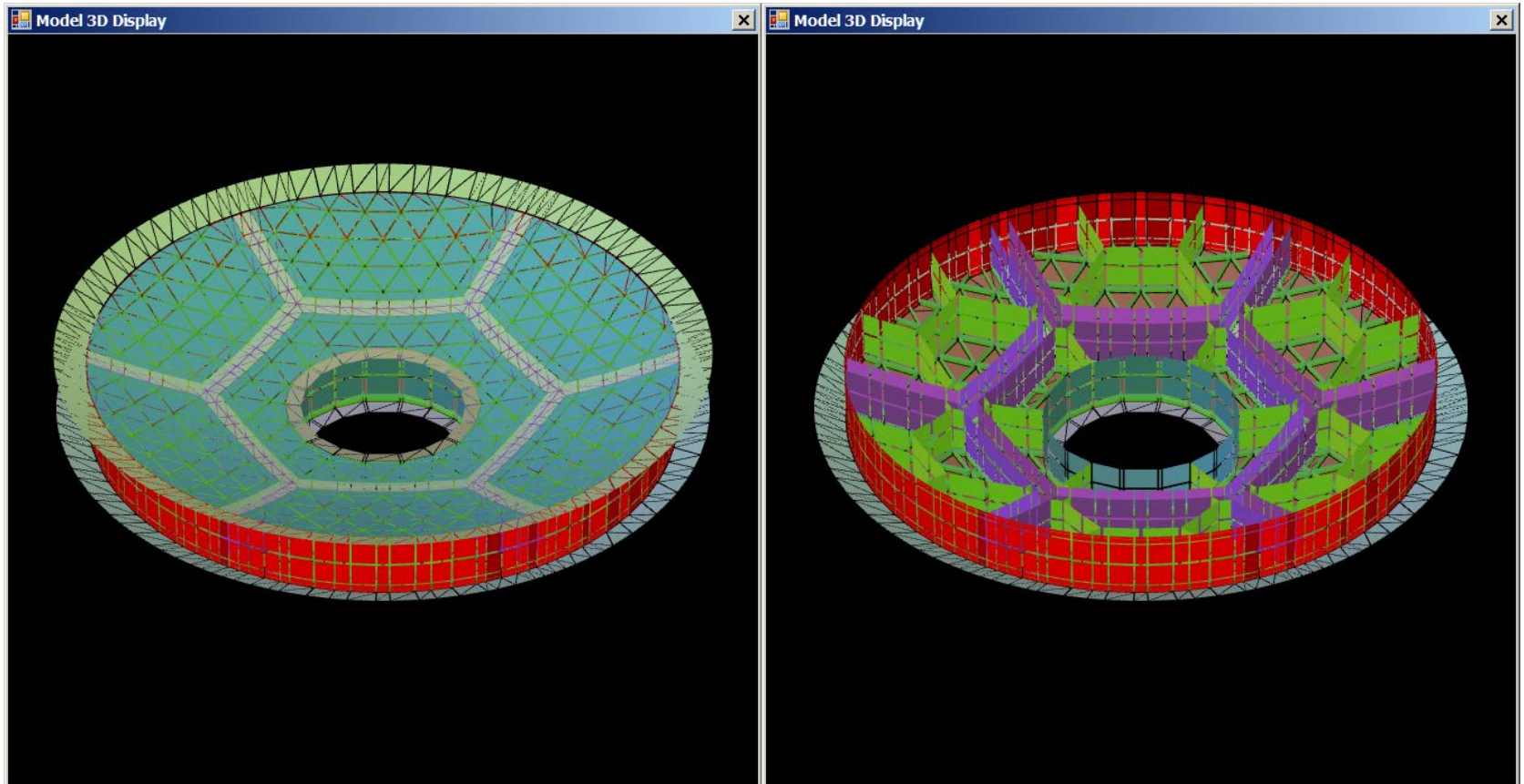
GRID COMPLEXITY LEVELS (CONT)



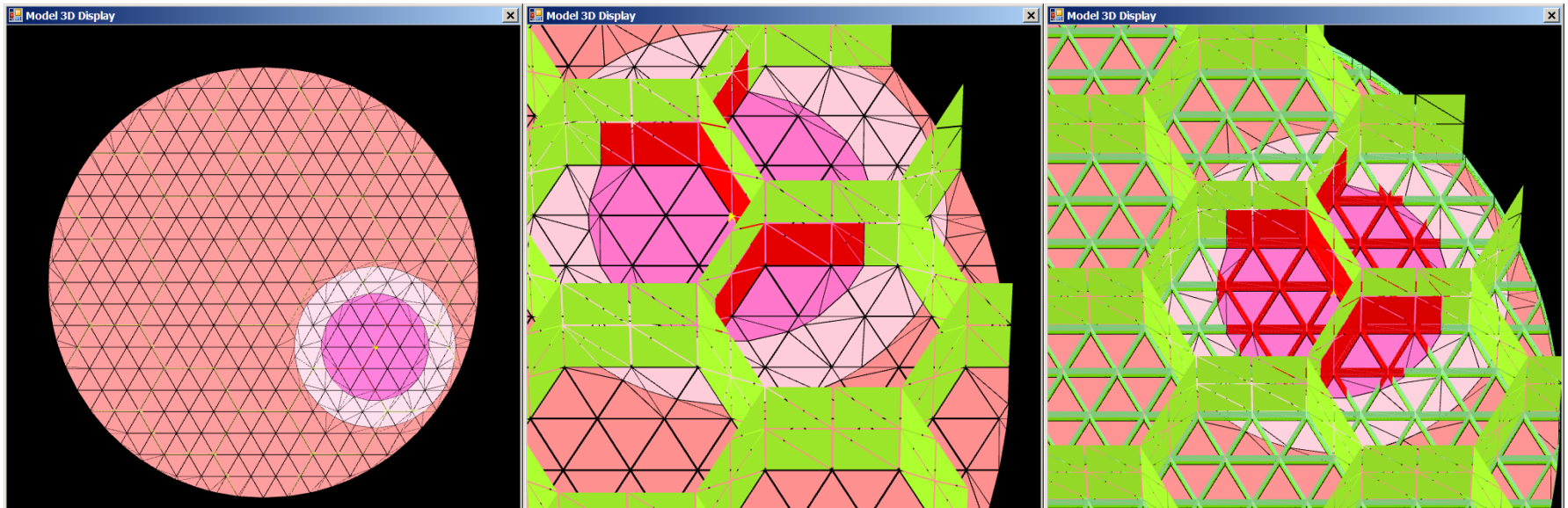
GRID COMPLEXITY LEVELS (CONT)



MODEL DISPLAY NOW SUPPORTS COLOR-BASED REAL CONSTANTS



LOCALIZED REINFORCEMENT & MESH REFINEMENT UNDER PADS



A perimeter around pad can be reinforced or just mesh refined . The core structure can be stiffened as well as any back facesheet isogrid pattern in region of bond pads.

LASTEST GUI WITH MORE EFFICIENT MESH ALGORITHM

Arnold Mirror Modeler(c) 2.3.5.0

Grid
 numNodes = 175
 numElements = 738
 numFaces = 564
 cell1 = 0.215
 Sgmt Dia = 0.816
 Sgmt Lip = 0.032

Cell Width 0.215

Inner Dia 0.3
Inner Lip 0.05
Outer Dia 2
Mirror Lip 0.05

Output Format
 ANSYS
 ABAQUS
 NASTRAN

Supports
 By Segment
 Whole Mirror

SAVE SETTINGS **CREATE GRID**
RESTORE ALL **MAKE SUPPORT**
MERGE POINTS **CREATE MODEL**
MERGE NODES **REFINE PADS**
TRISECT FRONT **WRITE MODEL**

Model Statistics

1895	num Nodes
5619	num Elems
64.6235	Weight (kg)
0.784479	Area (m ²)
82.3776	AD (kg/m ²)
46.88022	Faces (kg)
17.74321	Core (kg)
9.227797	Edges (m)
0.01574	Milled (m ³)

Archive Loaded
None

Status
6 bad aspect ratio elems

Tangent Bars | **Static** | **Dynamic** | **BouleMap** | **Graphics** | **RefineMesh** | **WhiffleTree**
Grid Options | **Core** | **Optical** | **Reals (1)** | **Reals (2)** | **Hexapod** | **Axial** | **Radial**

Outer Sgmt Lip
 Outer Mirror Lip
 Inner Mirror Lip
 Circular Segment
 Circular Mirror
 Seal Ring Outer
 Seal Ring Inner
 Seal Ring Mirror
 Continuous Seal Rings
 Segment Lip Ribs
 Web Centric Grid

Isogrid Front
 Isogrid Back
 Backface Holes
 Core Projection
 Include Fillets
 Off Center Pattern
 No Backsheet
 Central Hole
 Omit Central Sgmt
 Make Quad Elements
 Variable Facesheet

Cell Level 0
 Cell Level 1
 Cell Level 2
 Cell Level 3
 Cell Level 4

ONLY APPROPRIATE ENTREES ACTIVE FOR INPUT

Arnold Mirror Modeler(c) 2.3.5.0

Grid
 numNodes = 1876
 numElems = 10471
 numFaces = 2008
 cell1 = 0.215
 Sgmt Dia = 0.316
 Sgmt Gap = 0.075
 Sgmt Lip = 0.032
 #Mirror00
 #Mirror01
 #Mirror02

Cell Width 0.215

Output Format
 ANSYS
 ABAQUS
 NASTRAN

Supports
 By Segment
 Whole Mirror

SAVE SETTINGS **CREATE GRID**
RESTORE ALL **MAKE SUPPORT**
MERGE POINTS **CREATE MODEL**
MERGE NODES **REFINE PADS**
TRISECT FRONT **WRITE MODEL**

Model Statistics

5508	num Nodes
10471	num Elems
200.0832	Weight (kg)
3.065068	Area (m ²)
65.27857	AD (kg/m ²)
99.21635	Faces (kg)
100.8694	Core (kg)
40.9551	Edges (m)
0	Milled (m ³)

Archive Loaded
None

Status
NodeMerge 0 elems removed

Tangent Bars | **Static** | **Dynamic** | **BouleMap** | **Graphics** | **RefineMesh** | **WhiffleTree**
Grid Options | **Core** | **Optical** | **Reals (1)** | **Reals (2)** | **Hexapod** | **Axial** | **Radial**

r, 1	0.005	Front Facesheet	<input type="checkbox"/>	Show
r, 2	0.005	Back Facesheet	<input checked="" type="checkbox"/>	Show
r, 3	0.005	Front IsoGrid Web	<input type="checkbox"/>	Show
r, 4	0.005	Segment Outer Seal	<input checked="" type="checkbox"/>	Show
r, 5	0.005	Inner Seal Ring	<input type="checkbox"/>	Show
r, 6	0.005	Core Web	<input checked="" type="checkbox"/>	Show
r, 7	0.005	Back IsoGrid Web	<input type="checkbox"/>	Show
r, 8	0.015	Front Outer Seg Lip	<input type="checkbox"/>	Show
r, 9	0.015	Back Outer Seg Lip	<input checked="" type="checkbox"/>	Show
r, 10	0.015	Isogrid Fillet Front	<input type="checkbox"/>	Show
r, 11	0.015	Isogrid Fillet Back	<input type="checkbox"/>	Show
r, 12	0.015	Mirror Outer Seal	<input type="checkbox"/>	Show

Mirror Material
 ULE
 Zerodur
 E6
 Fused Silica
 BK7
 Silicon Carbide



STATUS



- **Currently undergoing ITAR review to determine any distribution restrictions.**
- **NASA is working on licensing, revision control and error reporting mechanisms.**
- **User Manual and tutorials under development.**
- **Short course or seminar under discussion.**
- **List of possible enhancements and requested features growing daily.**

- **Time permitting are there any questions?**