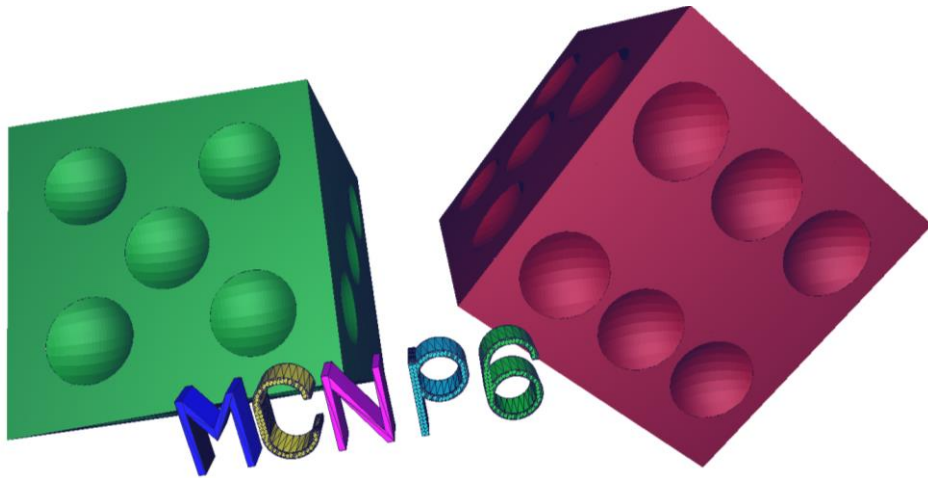


An MCNP6 Version of the Visual Editor

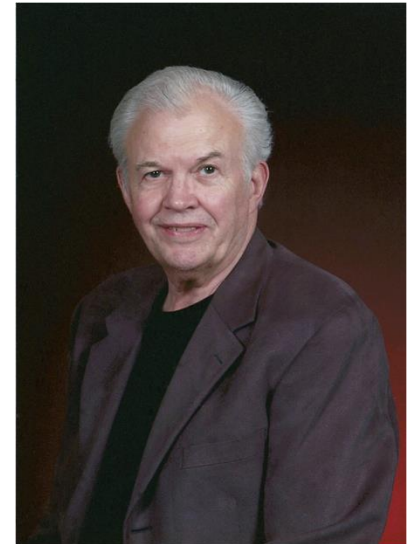
Presented at the
American Nuclear Society
Radiation Physics & Shielding Division
meeting
Knoxville, Tennessee
September 14 – 18, 2014



Randy Schwarz
Visual Editor Consultants
www.mcnpvised.com

History of the Visual Editor

- 1. Initially developed at Westinghouse Hanford Company in the early 1990s.**
- 2. Development led by Dr. Lee Carter.**
- 3. 1993: Initial paper published**
- 4. 1997: Initial release to RSICC**
- 5. 1999: First workshop offered**
- 6. 2002: Windows version created**
- 7. 2008: MCNPX version created**
- 8. 2014: MCNP6 version created**



What is the Visual Editor?

1. Visual Creation and Display of your Design.

Airplane analysis software

Rocket analysis software

Nuclear analysis software

Subsonic Aerodynamic Drag

Nose/Body	.12785
Base	.08111
Fin Surfaces	.04594
Fin Interference	.01837
Launch Lug	.01911

Calculate Cd as Function of Velocity [ft/sec]

Maximum Mn PLOT

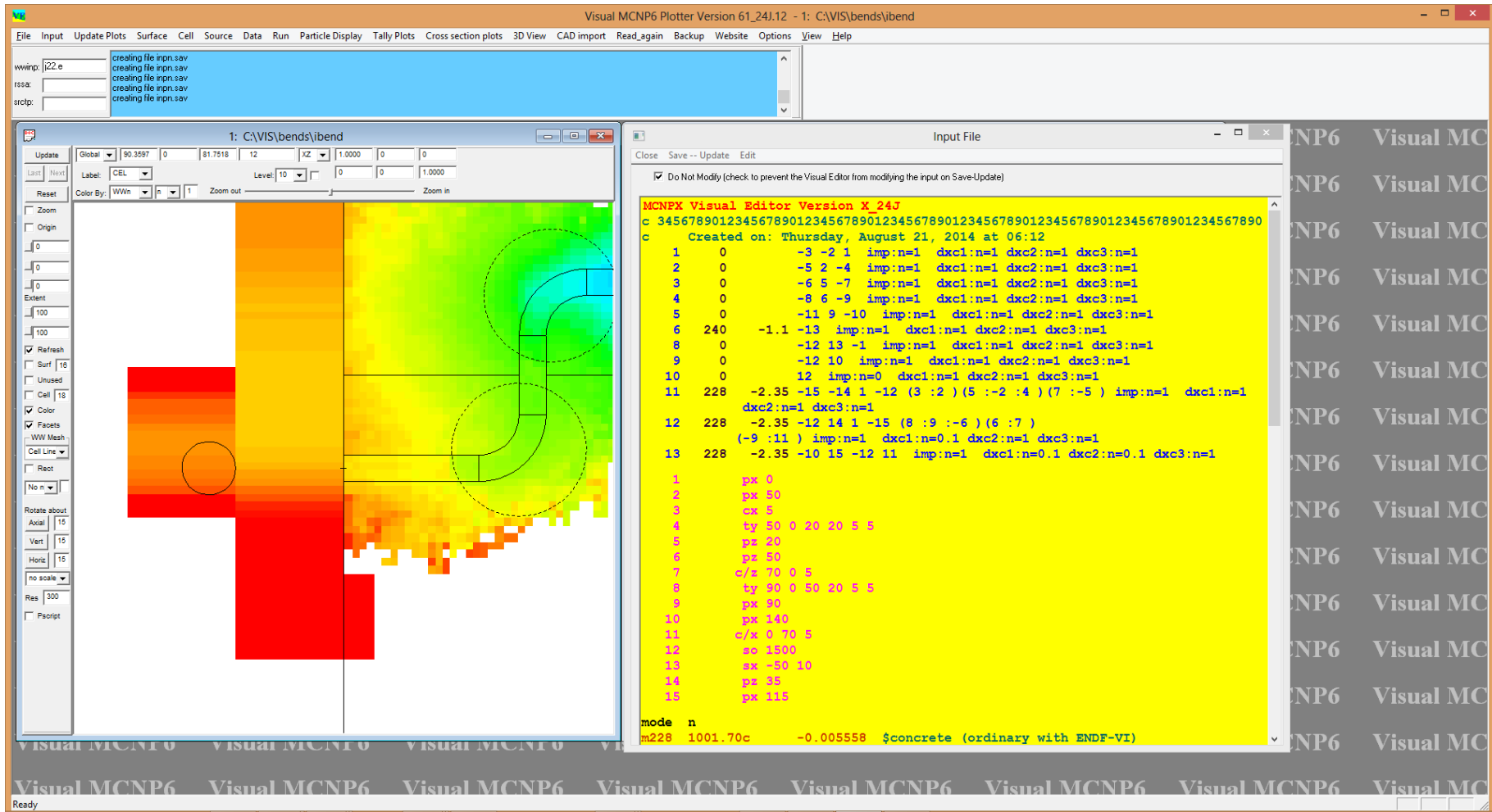
Velocity: 4466 Mach Number: 4. Rn: 517826974

1. Cd

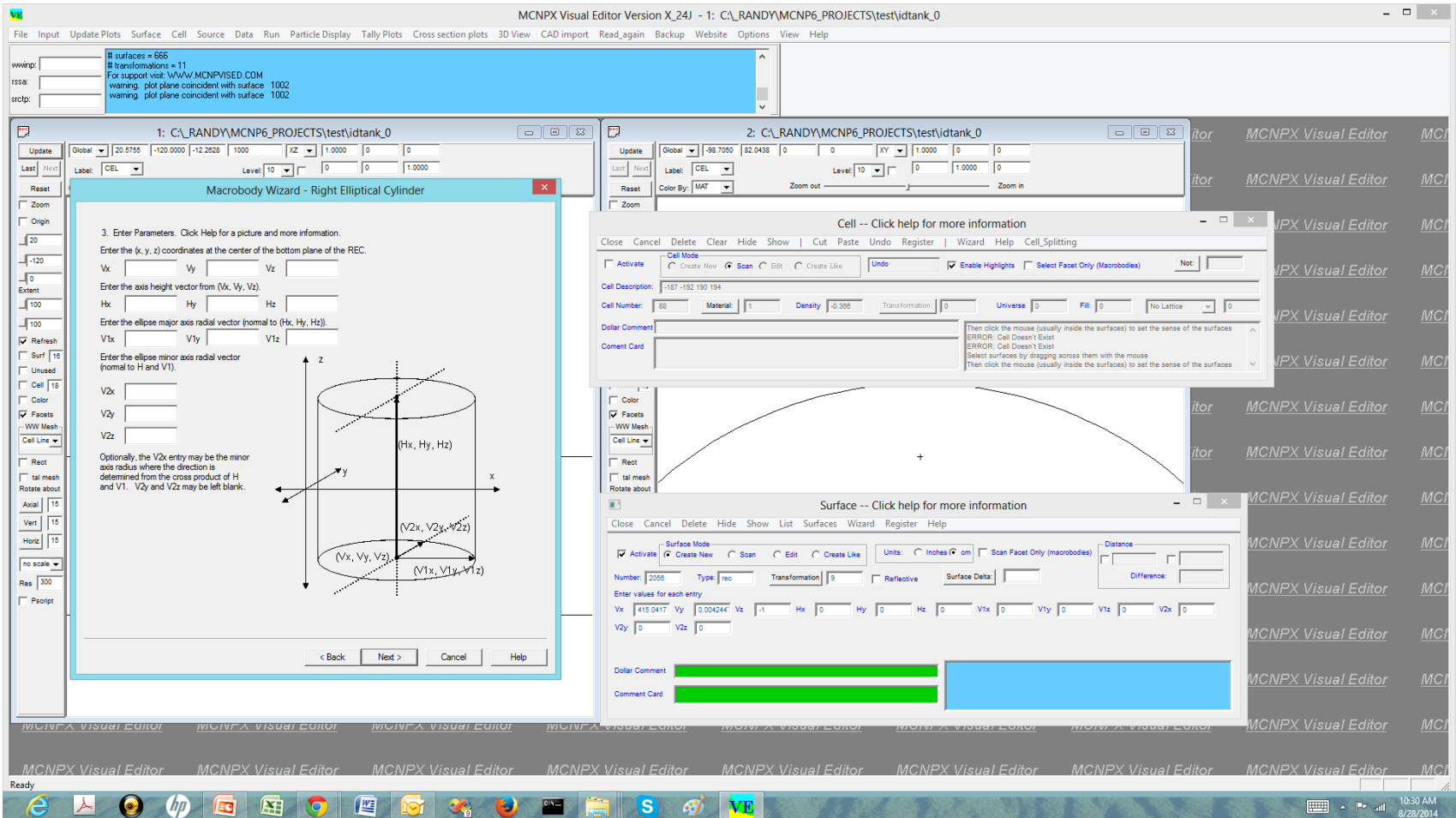
Mach Number (Mn) 4.0

```
File Edit Format View Help
pig - Notepad
/home/ra528/pig/dat
1 3 -11.4 -1 -5 43 19 11
2 201 -0.83 -6 -2 1 19
3 201 -0.83 4 -3 -18
4 201 -0.83 -6 5 12 -1
5 3 -11.4 -46 13 -17
6 201 -0.83 (-2 7 -0 46) (-39 1 -37 18 1 -46 12 1 -7 )
7 3 1 -6 -12 10
8 201 -0.83 -9 -5 11 12
9 201 -0.83 -10 -12 11
10 201 -0.83 17 -14 -16 13
11 201 -0.83 -13 6 -7
12 0 -14 15 15 -7
13 201 -0.83 -14 15 -17
14 201 -0.83 -2 -19 18 4
15 3 -11.4 -19 53 -32
16 0 (-23 2 -20 4) (37 139 1 -38 1 -36 1 -35 18 )
17 201 -0.83 -24 -12 22 20
18 201 -0.83 -4 -20 22
19 0 -7 14 8
20 0 -23 -2 0
21 201 -0.83 -25 -21 24
22 0 -24 -20 23
23 201 -0.83 -26 29 21 -28
24 201 -0.83 -27 -30 20 21
25 201 -0.83 -31 30 21 -26
26 0 32 -18 3
27 0 33 -17 -15
28 0 34
29 0 (-34) (61 167 1 -64 )
30 3 -11.4 -5 -43 42 11
31 3 -11.4 41 -42 -5 11
32 3 -11.4 -41 -40 -5 19 11
33 3 -11.4 9 -5 -40 11
34 3 -11.4 46 -47 -17
35 3 -11.4 (47 -48 -17) (-33 15 17 )
36 3 -11.4 -49 48 -33
37 3 -11.4 49 15 -33
38 3 -11.4 -51 52 -32
39 3 -11.4 -52 51 -32
40 3 -11.4 -53 50 -32
41 3 -11.4 -50 3 -32
42 201 -0.83 -46 -6 -2 7
43 0 7 -2 -8 46 39
44 3 -11.4 44 -1 -11
45 3 -11.4 -1 -48 19
46 0 ((((-45 -59 62) (25 1 -22 121) (30 127
47 0 (-21 33 126 1 -30) (28 1 -21 -29 126 )
48 0
```

Creating Geometries Using the Visual Editor



Creating Geometries Using the Visual Editor



Creating Geometries Using the Visual Editor

MCNPX Visual Editor Version X_23x - 2: F:\MCNPX_projects\test_dir\buss13a

File Input Update Plots Surface Cell Source Data Run Particle Display Tally Plots Cross section plots 3D View CAD import Read_again Backup Website Options View Help

wwinp: warning 1- or 2-character identifiers request neutron tables.
 rssa: warning without bremsstrahlung, flux estimates will be low.
 srclp: warning 1 surfaces were deleted for being the same as others.
 warning 1 materials had unnormalized fractions. print table 40.
 creating file inpr.sav

1: F:\MCNPX_projects\test_dir\buss13a

Update Global 0 168.7209 53.9589 YZ 0
 Label: CEL Level: 10
 Color By: MAT Zoom out
 Zoom Origin Extent 0 100 100
 Refresh Surf 16 Unused Cell 18 Color Facets WW Mesh Cell Line

2: F:\MCNPX_projects\test_dir\buss13a

Update Global 0 60.8187 -50.3382 YZ 0
 Label: CEL Level: 10
 Color By: IMP Zoom out
 Zoom Origin Extent 0 79.4328 79.4328
 Refresh Surf 16 Unused Cell 18 Color Facets WW Mesh Cell Line

3: Vised plot: 3

Update Global 31.7731 0 35.5413 XZ 1.00
 Label: CEL Level: 10
 Color By: MAT Zoom out
 Zoom Origin Extent 0 -40 79.4328 79.4328
 Refresh Surf 16 Unused Cell 18 Color Facets WW Mesh

Input File
 Close Save Update Edit
 Do Not Modify (check to prevent the Visual Editor from modifying the input on S)

```

3 0 5 12 -1 -6
4 0 (-16 1 200 -20 ):(-204 -200 202 )
5 0 ((-21 ) (11 :15 :-4 :14 :10 )):(8 -13
6 0 21
7 1 -2.6 -80 -22 30 u=1 $INNER CAPSULE SOURCE
8 2 -7.8 -80 (-32 -23 27 )(-30 :31 :22 ) u=1 $I
9 0 (-28 -24 27 )(32 :23 ) u=1 $void betwe
10 2 -7.8 -80 (-25 -29 26 )(28 :24 :-27 ) u=1 $O
11 0 (-33 -35 36 ) trcl=1 fill=1 $capsule F
12 0 -3 -1 34 #11 #16 #19 #20 #27 20 40 $v
13 0 (-33 -35 36 ) trcl=2 fill=1
14 0 (-33 -35 36 ) trcl=3 fill=1
15 0 (-33 -35 36 ) trcl=4 fill=1
16 0 (-33 -35 36 ) trcl=5 fill=1
17 0 (-33 -35 36 ) trcl=6 fill=1
18 0 (-33 -35 36 ) trcl=7 fill=1
19 0 (-33 -35 36 ) trcl=8 fill=1
20 0 (-33 -35 36 ) trcl=9 fill=1
21 0 (-33 -35 36 ) trcl=10 fill=1
22 0 (-33 -35 36 ) trcl=11 fill=1
23 0 (-33 -35 36 ) trcl=12 fill=1
24 0 (-33 -35 36 ) trcl=13 fill=1
25 0 (-33 -35 36 ) trcl=14 fill=1
  
```

Ready

Creating Geometries Using the Visual Editor

The image displays the MCNPX Visual Editor interface, showing a 3D model of a reactor core geometry. The main window is titled "1: F:\MCNPX_projects\testdir\c103.txt" and contains a 3D view of the reactor core. The interface includes a menu bar (File, Input, Update Plots, Surface, Cell, Source, Data, Run, Particle Display, Tally Plots, Cross section plots, 3D View, CAD import, Read_again, Backup, Website, Options, View, Help) and a status bar at the bottom.

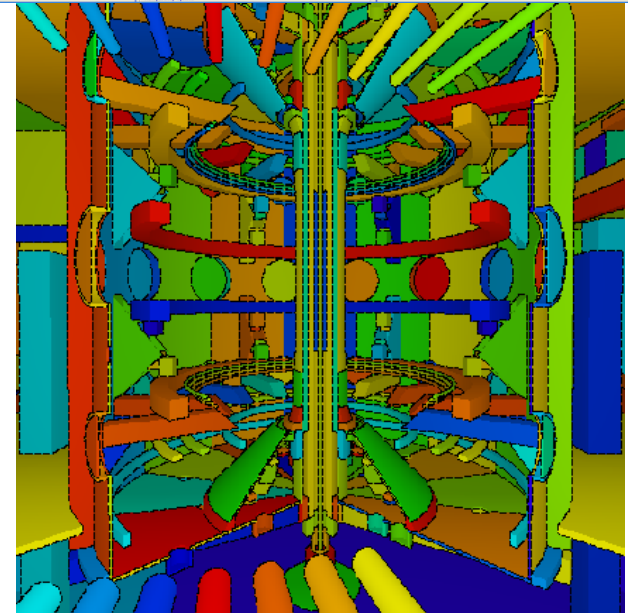
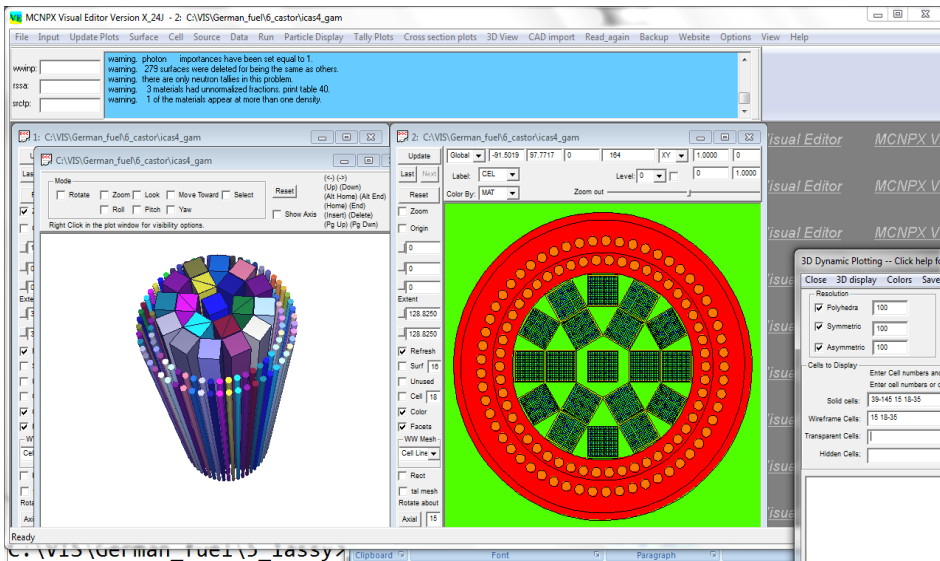
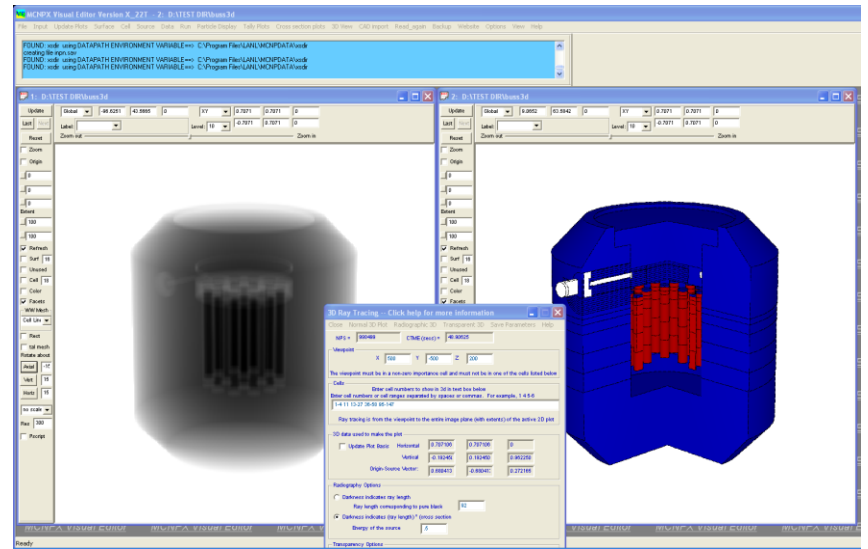
Warning messages are displayed in the top-left corner:

- wwinp: warning without bremsstrahlung, flux estimates will be low.
- rsaa: warning without bremsstrahlung, flux estimates will be low.
- rsaa: warning 5 surfaces were deleted for being the same as others.
- scdp: error in visvtp for surface 25 1
- warning sum of segment sizes differs from total in 1 cases.

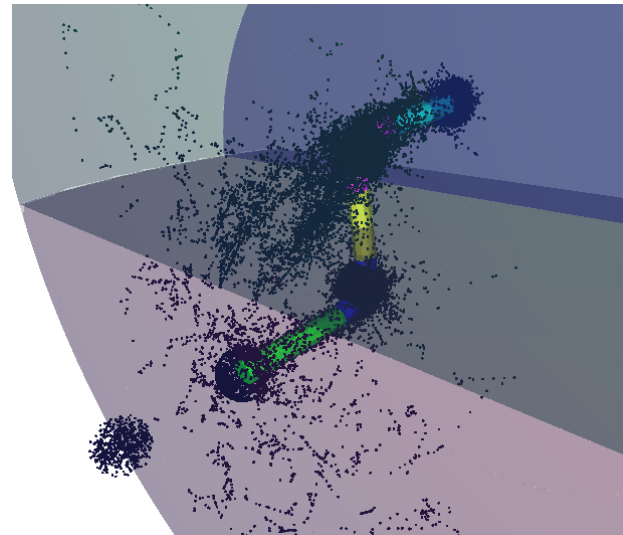
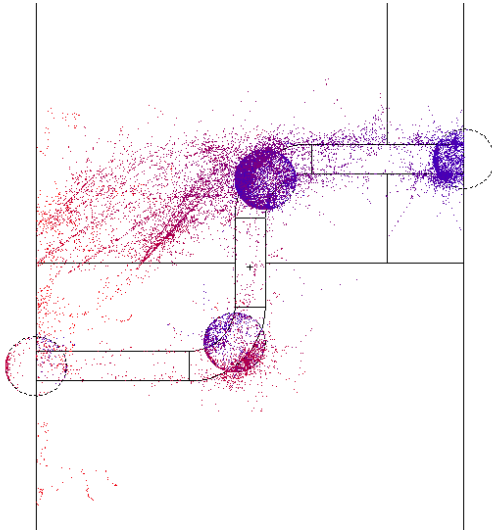
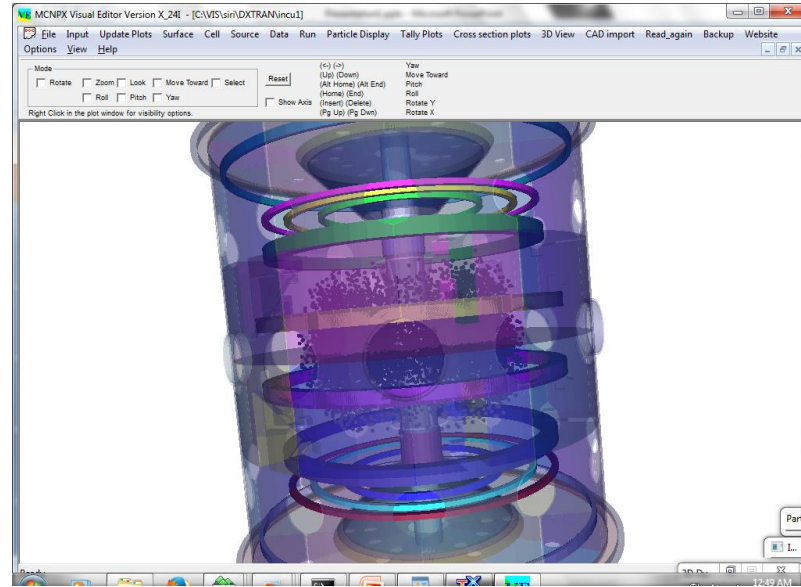
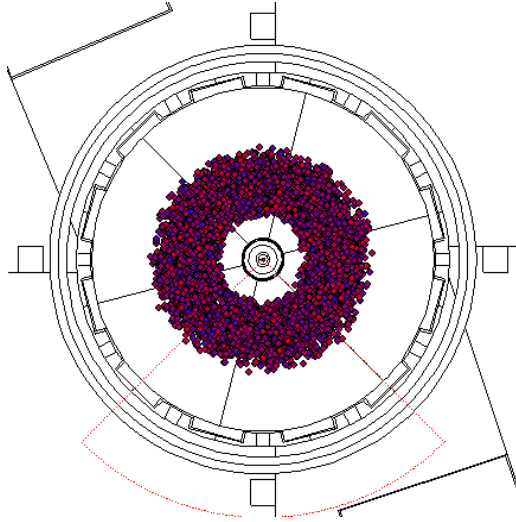
The 3D view shows a complex reactor core structure with various components, including fuel elements, control rods, and structural supports. The model is rendered in a 3D perspective view. The interface also includes several control panels for each plot window, such as "Vised plot: 3", "2: F:\MCNPX_projects\testdir\c103.txt", and "1: F:\MCNPX_projects\testdir\c103.txt". These panels allow users to adjust the view, including zooming, panning, and refreshing the plot. The "Color By:" option is set to "MAT" (Material) in all panels.

Additional panels at the bottom show detailed views of specific components, such as a fuel element and a control rod, with their respective material and color settings. A right-click context menu is visible in the bottom-right plot window, showing options for visibility and other settings.

3D Display



Particle Tracks



What is the Visual Plotter?

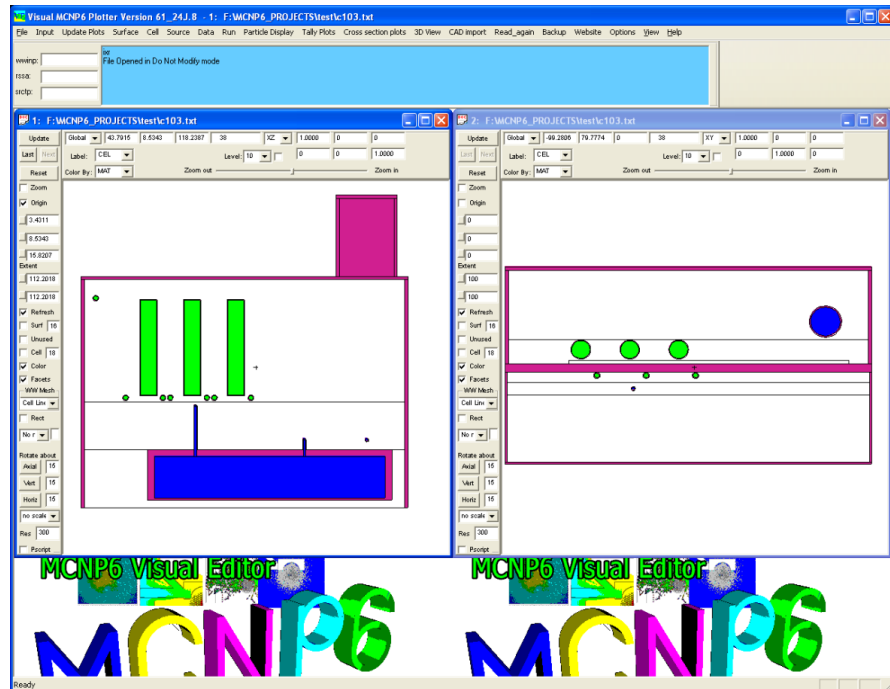
1. MCNP6 Plotter

1. Geometry

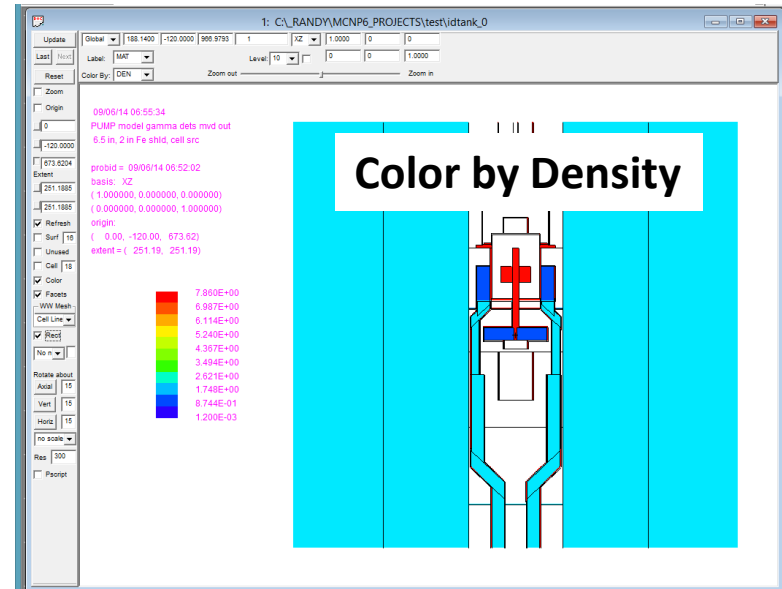
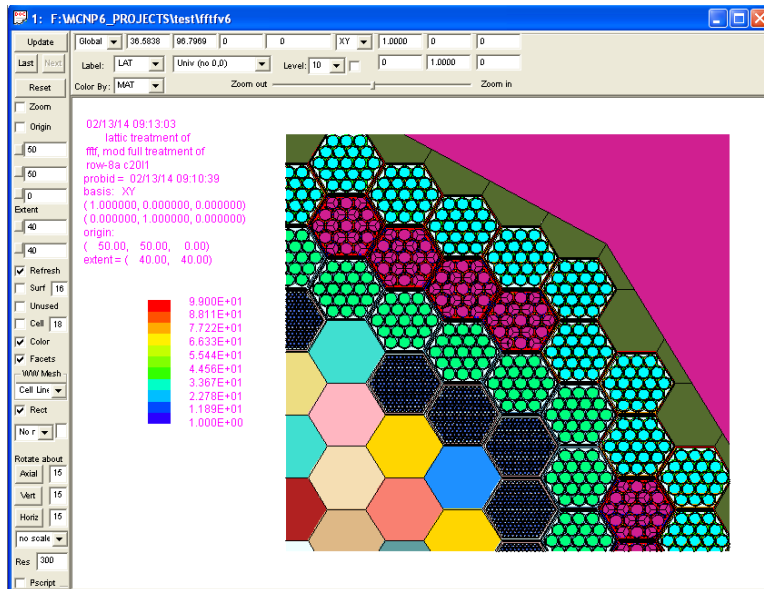
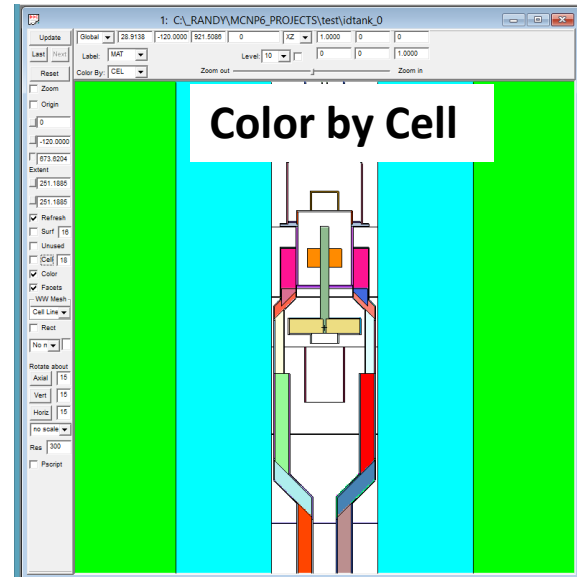
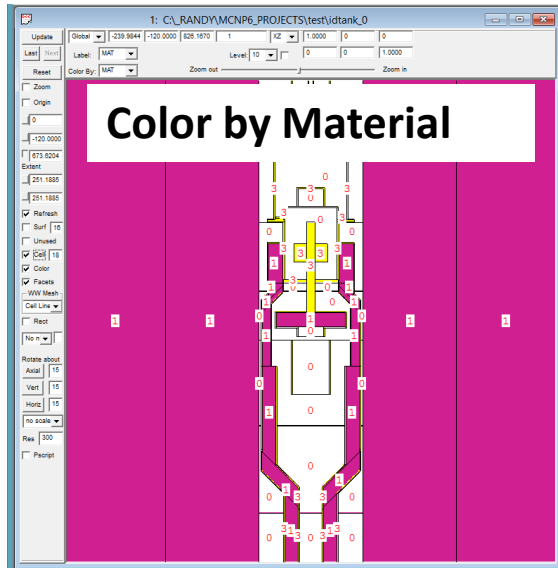
2. Tally

3. Cross sections

2. Can not modify the input or create geometries.



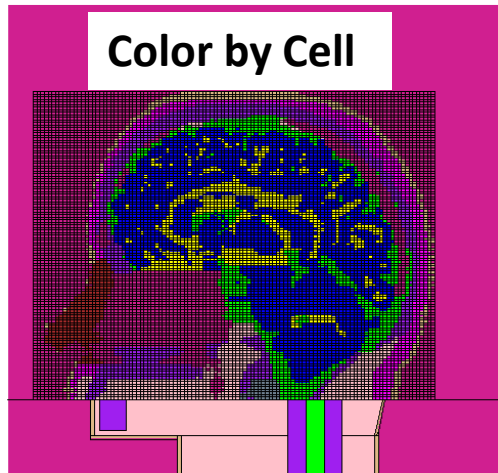
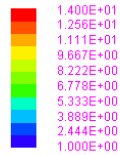
Geometry plots



Geometry plots

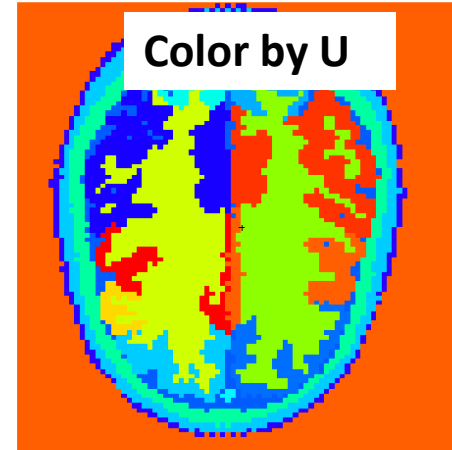
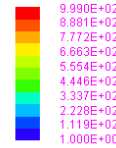
12/21/13 15:06:32
Modified Zubal Head Phantom

probid = 12/21/13 14:39:26
basis: YZ
(0.000000, 1.000000, 0.000000)
(0.000000, 0.000000, 1.000000)
origin:
(-0.54, 0.00, 85.90)
extent = (14.93, 12.80)



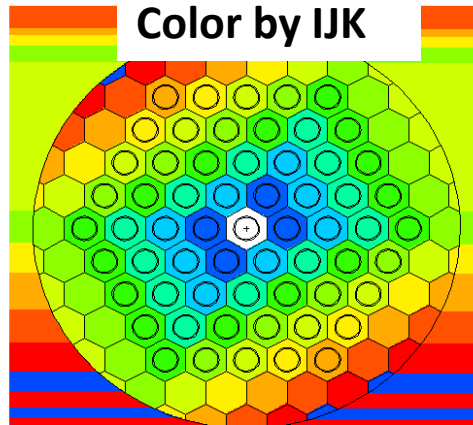
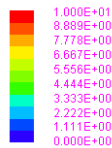
12/21/13 18:44:53
Modified Zubal Head Phantom

probid = 12/21/13 18:35:12
basis: XY
(1.000000, 0.000000, 0.000000)
(0.000000, 1.000000, 0.000000)
origin:
(-0.58, -0.41, 88.55)
extent = (10.14, 10.14)



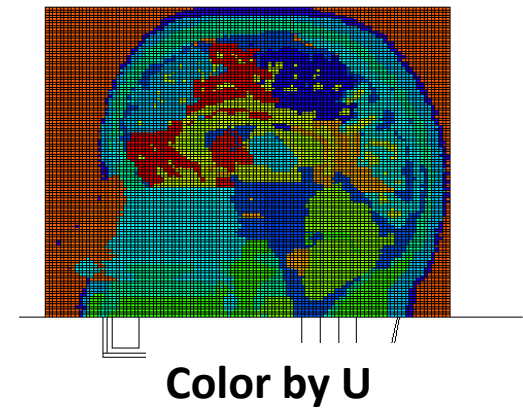
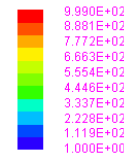
12/20/13 11:37:17
Lattice Example: MCNPX Visual
Editor Version X_23V

probid = 12/20/13 11:33:43
basis: XY
(1.000000, 0.000000, 0.000000)
(0.000000, 1.000000, 0.000000)
origin:
(0.00, 0.00, 0.00)
extent = (100.00, 100.00)



12/21/13 15:08:07
Modified Zubal Head Phantom

probid = 12/21/13 14:39:26
basis: YZ
(0.000000, 1.000000, 0.000000)
(0.000000, 0.000000, 1.000000)
origin:
(-0.54, 0.00, 85.90)
extent = (14.93, 12.80)



Tally Plots

Visual MCNP6 Plotter Version 61_24J.12 - 1:

File Input Update Plots Surface Cell Source Data Run Particle Display Tally Plots Cross section plots 3D View CAD import Read_again Backup Website Options View Help

wwirp: # cells = 9460301
surfaces = 0
transformations = 0
For support visit: WWW.MCNPVISED.COM
creating file inprn.sav

Label: CEL Level: 10 0 0 1

Color By: MAT Zoom out Zoom in

Compare initial and final flux
for tally 2 and 12

mcnp 6
probi 09/08/14 05:22:3
tally 2
n
nps 250894
f(e) bin normed
runtpe = j24.r
dump 2
f Surface 1
d Flag/Dir 1
u User 1
s Segment 2
m Mult 1
c Angle 1
e Energy *
t Time 1
— final flux
..... initial flux

Tally Plotting -- Click help for more information

File Information
Current_directory = C:\W\ibends
Runpe Metal Filename = j24.r
Write metal file
Dump No.

Tally number to Plot: 12 Print IPTAL array COPLOTT Write Data Points

2D Plot Mesh Contour Fluctuation KCODE

Independent Energy (E)
Dependent Cell/Surface/Detector (F)

Fixed
Energy (E)
Cell/Surface/Detector (F)
2 Segment (S)
Cosine (C)
Time (T)
Multiplier (M)
User-defined (U)
Total vs. Direct/Flagged vs. unflagged (D)
1st lattice/mesh index
2nd lattice/mesh index
3rd lattice/mesh index

Perturbation number

Hand Entry

```
title 1 "Compare initial and final flux" &  
title 2 "for tally 2 and 12" &  
label "final flux" &  
linlog &  
ylim 1.000000e-012 1.000000e-001 &  
cop fix S 2 &  
tal 12 &  
label "initial flux"  
end  
*****
```

Tally Titles

Title line Compare initial and final flux
Title line for tally 2 and 12
Place titles at Bottom

X axis title:
Y axis title:
Z axis title:
Curve label: initial flux
Sub: initial flux
X: .8 Y: .0001
Legend: Default Location X: Y:

Tally Options

Plot type: Histogram
Axis: Linlog
Normalization: Normalize bins
Plot Thickness: Thin
Scales: With scales, no grid Include error bars

X-axis: Min Max Steps
Y-axis: Min 1e-12 Max .1 Steps

X factor: X Constant:
Y factor: Y Constant:
Z factor: Z Constant:

Print Points

Ready

Tally Plots

Tally Plotting -- Click help for more information

Close Read_Tally_data Run Time Tally Plot Titles Options Reset Help

File Information
Current_directory = C:\VIS\bends
Run type: Run type Metal Filename = j24.r
 Write metal file
Dump No.

Tally number to Plot: 12 Print IPTAL array COPLOT Write Data Points ==>

2D Plot | Mesh | Contour | Fluctuation | KCODE

Independent: Energy (E)
Dependent: Cell/Surface/Detector (F)

Fixed

- Energy (E)
- Cell/Surface/Detector (F)
- 2 Segment (S)
- Cosine (C)
- Time (T)
- Multiplier (M)
- User-defined (U)
- Total vs. Direct/Flagged vs. unflagged (D)
- 1st lattice/mesh index
- 2nd lattice/mesh index
- 3rd lattice/mesh index

Perturbation number

Hand Entry ==>

```
title 1 "Compare initial and final flux" &  
title 2 "for tally 2 and 12" &  
label "final flux" &  
LinLog &  
yfilm 1.000000e-012 1.000000e-001 &  
oop fix S 2 &  
tal 12 &  
label "initial flux"  
end  
=====
```

Plot commands

Tally Titles

Close Update Help

Title line: Compare initial and final flux
Title line: for tally 2 and 12
 Place titles at Bottom

X axis title:
Y axis title:
Z axis title:

Curve label: initial flux

Sub: initial flux
X: .8 Y: .0001

Legend: Default Location X: Y:

Tally Options

Close Update Help

Plot type: Histogram
Axis: Linlog
Normalization: Normalize bins
Plot Thickness: Thin

Scales: With scales, no grid Include error bars

X-axis: Min Max Steps
Y-axis: Min 1e-12 Max .1 Steps

X factor: X Constant:
Y factor: Y Constant:
Z factor: Z Constant:

Print Points

Tally Plots

The image shows a screenshot of the Visual MCNP6 software interface. The main window displays a plot of the tally results for file j24.r. The plot shows the energy spectrum (Energy in MeV on the x-axis, ranging from 0 to 1.2) versus the tally value (y-axis, ranging from 1e-12 to 1e-2). The plot is titled "file j24.r --- tally 2". The plot shows a sharp peak at low energy (around 0.01 MeV) and a broader distribution extending to 1.2 MeV. The plot is overlaid with a grid.

On the left side of the plot, there is a vertical label "Tally/MeV/particle". The plot is titled "file j24.r --- tally 2". The plot shows a sharp peak at low energy (around 0.01 MeV) and a broader distribution extending to 1.2 MeV. The plot is overlaid with a grid.

Below the plot, there is a legend for the data series:

```
f(e) bin normed
runtime = j24.r
dump 2
f Surface 1
d Flag/Dir 1
u User 1
s Segment 2
m Mult 1
c Angle 1
e Energy +
t Time 1
--- j24.r
- - - j24.r
```

On the right side of the interface, there is a "Hand Entry" window. The window contains the following text:

```
Hand Entry ==> ylims 1e-12 .1 tal 2 fix s 2 coop fix s 2 tal 12

printal
free E
free
tally numbers:
  2 12
end
=====
ylims 1e-12 .1 tal 2 fix s 2 coop fix s 2 tal 12
end
=====
```

Below the Hand Entry window, there is a "CellSurface/Detector (F)" window. The window contains the following text:

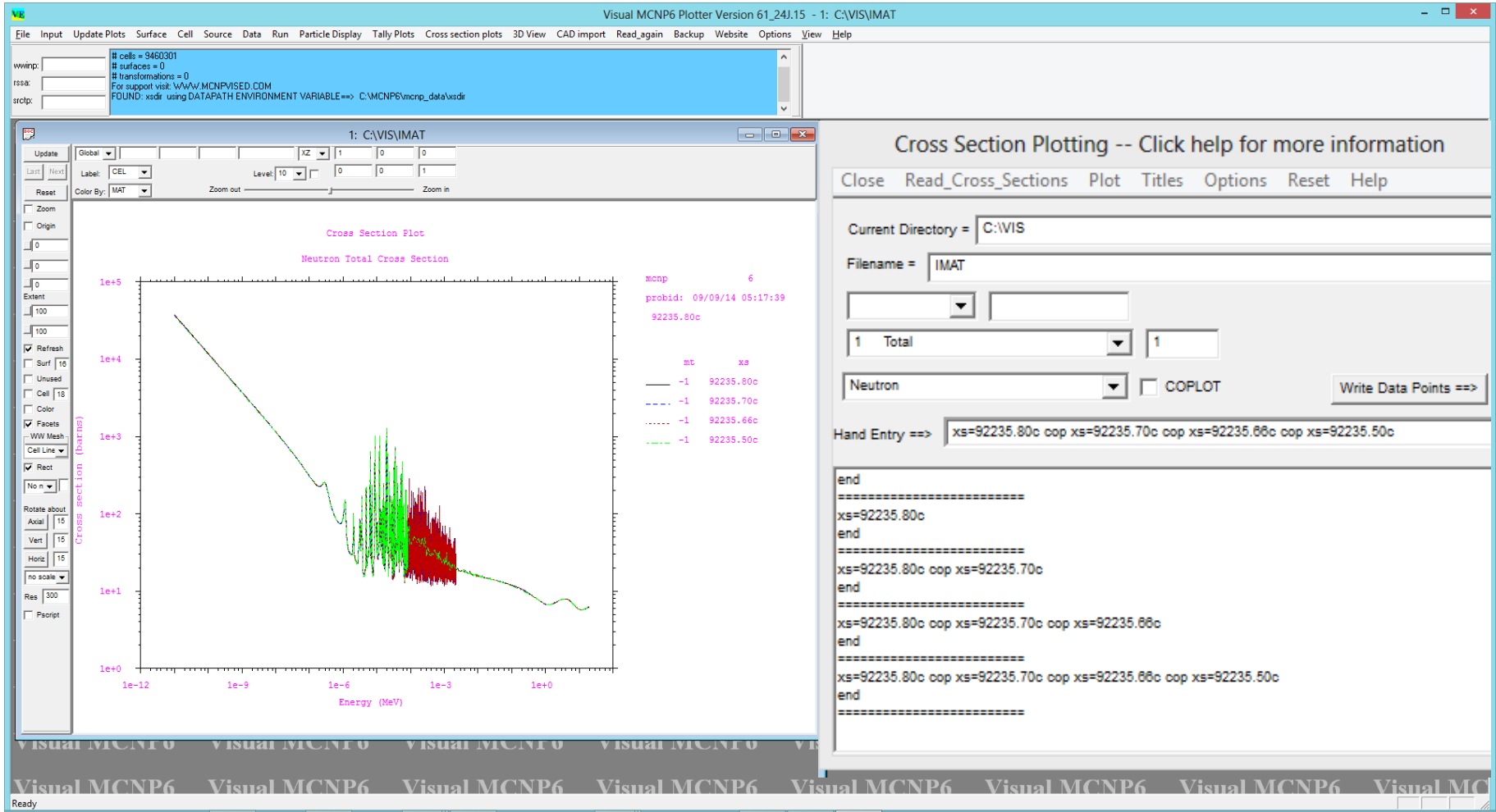
```
CellSurface/Detector (F)
Segment (S)
Cosine (C)
Time (T)
Multiplier (M)
User-defined (U)
Total vs. Direct/Flagged vs. unflagged (D)
1st lattice/mesh index
2nd lattice/mesh index
3rd lattice/mesh index
```

At the bottom of the interface, there is a "Hand Entry" window. The window contains the following text:

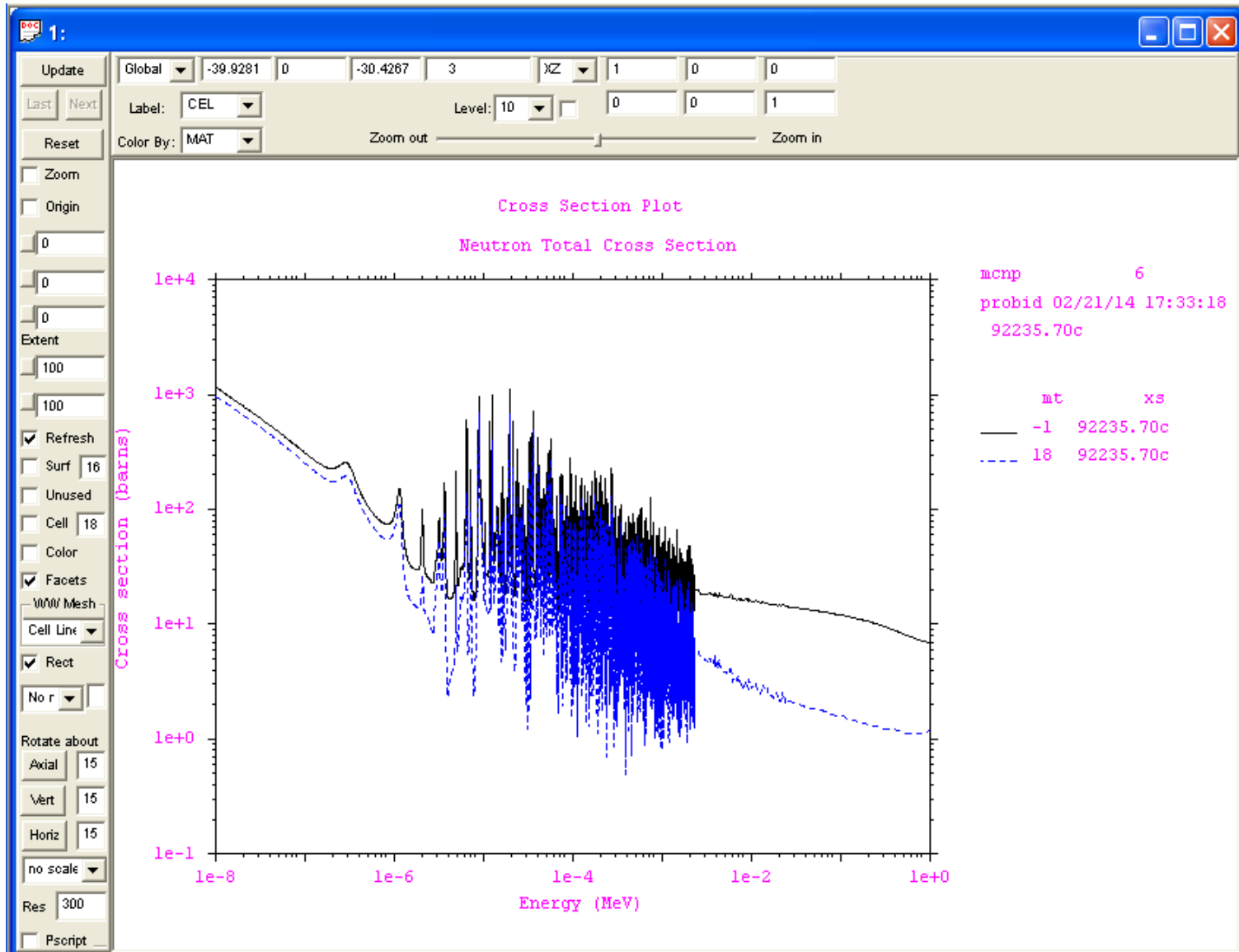
```
Hand Entry ==> ylims 1e-12 .1 tal 2 fix s 2 coop fix s 2 tal 12

printal
free E
free
tally numbers:
  2 12
end
=====
ylims 1e-12 .1 tal 2 fix s 2 coop fix s 2 tal 12
end
=====
```

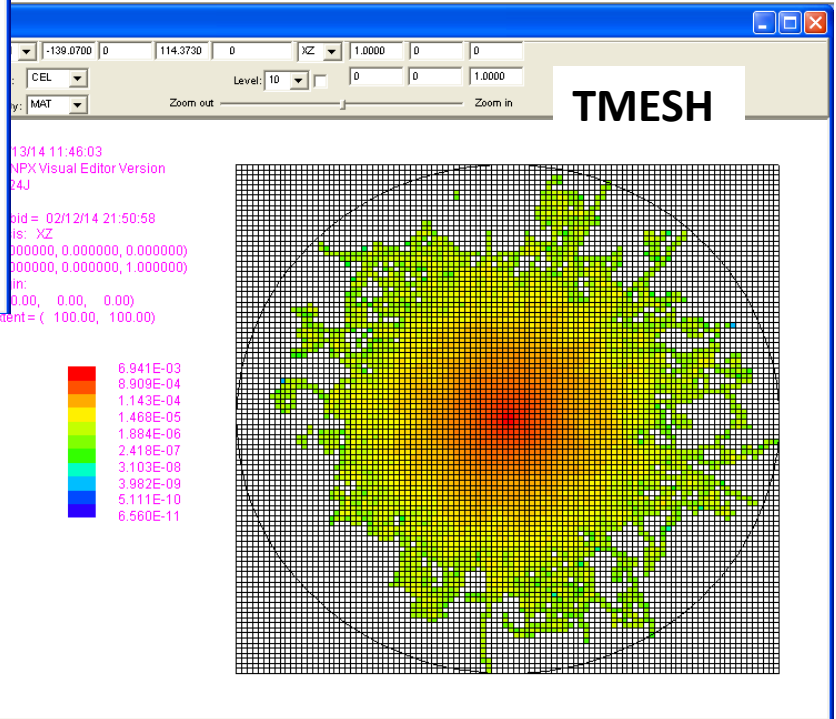
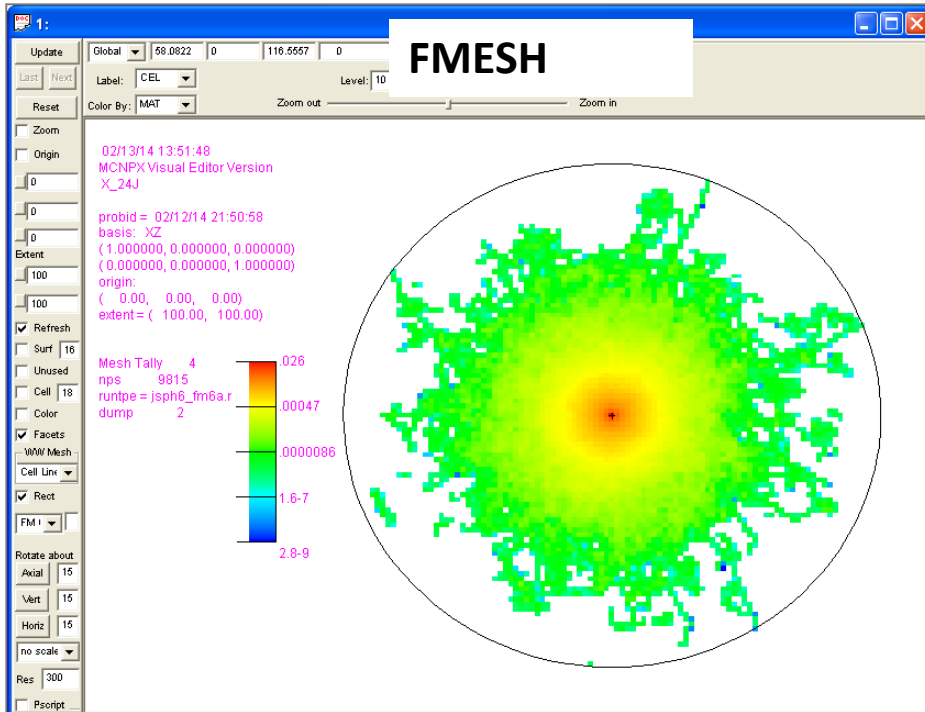
Cross Section Plots



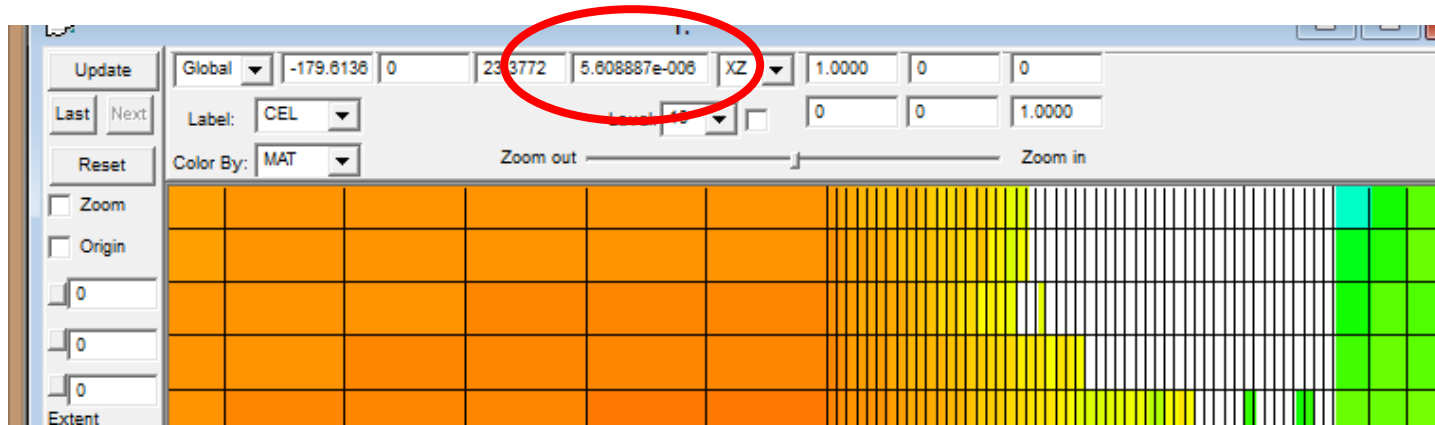
Cross Section Plots



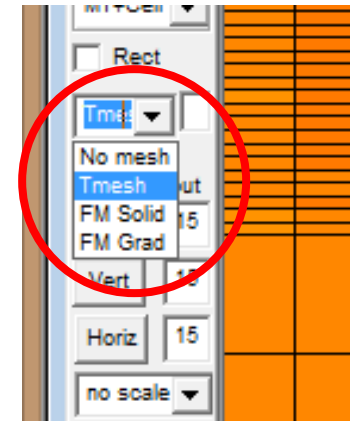
Mesh Tally Plots



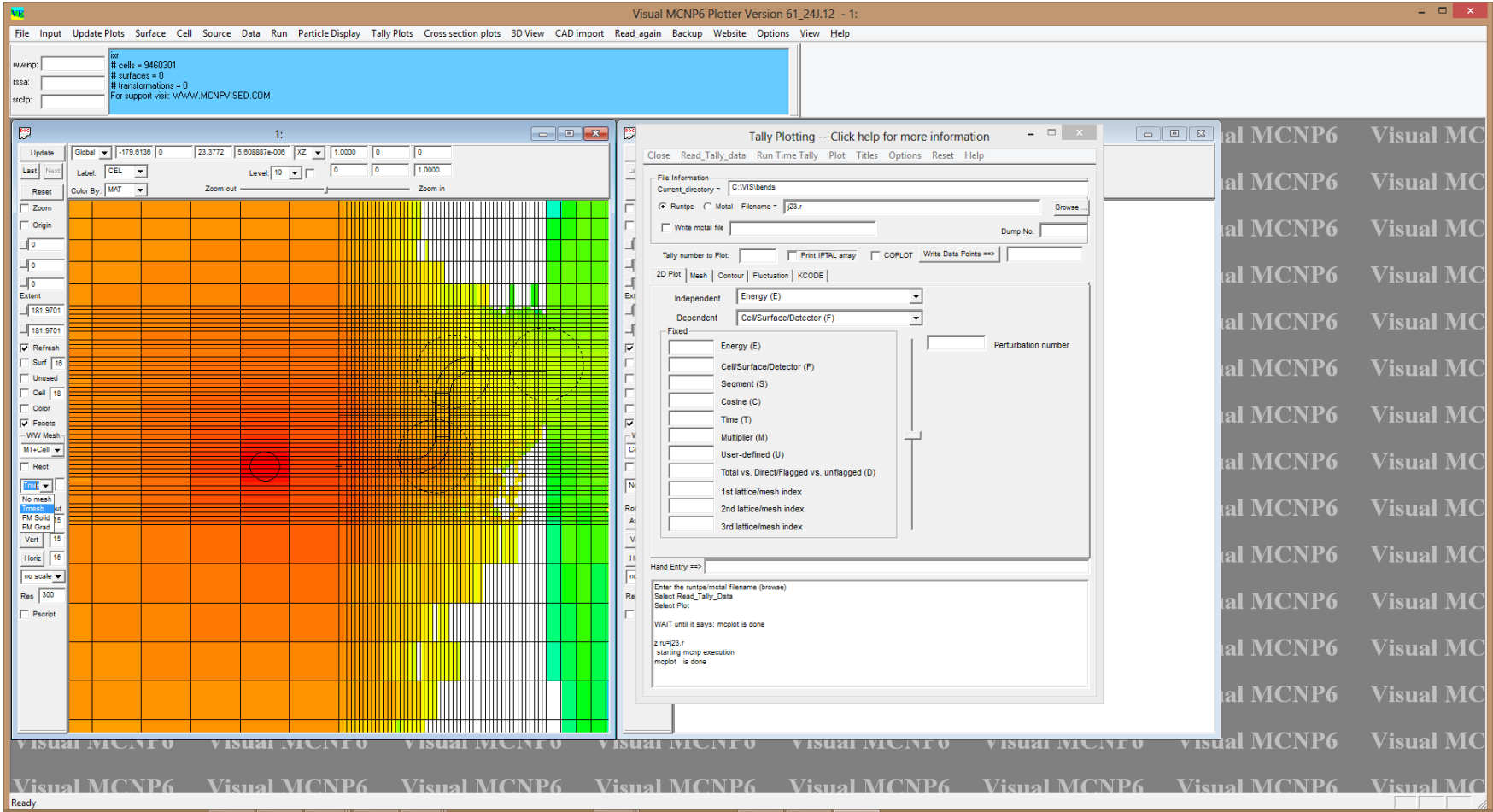
Tmesh Tally Plots



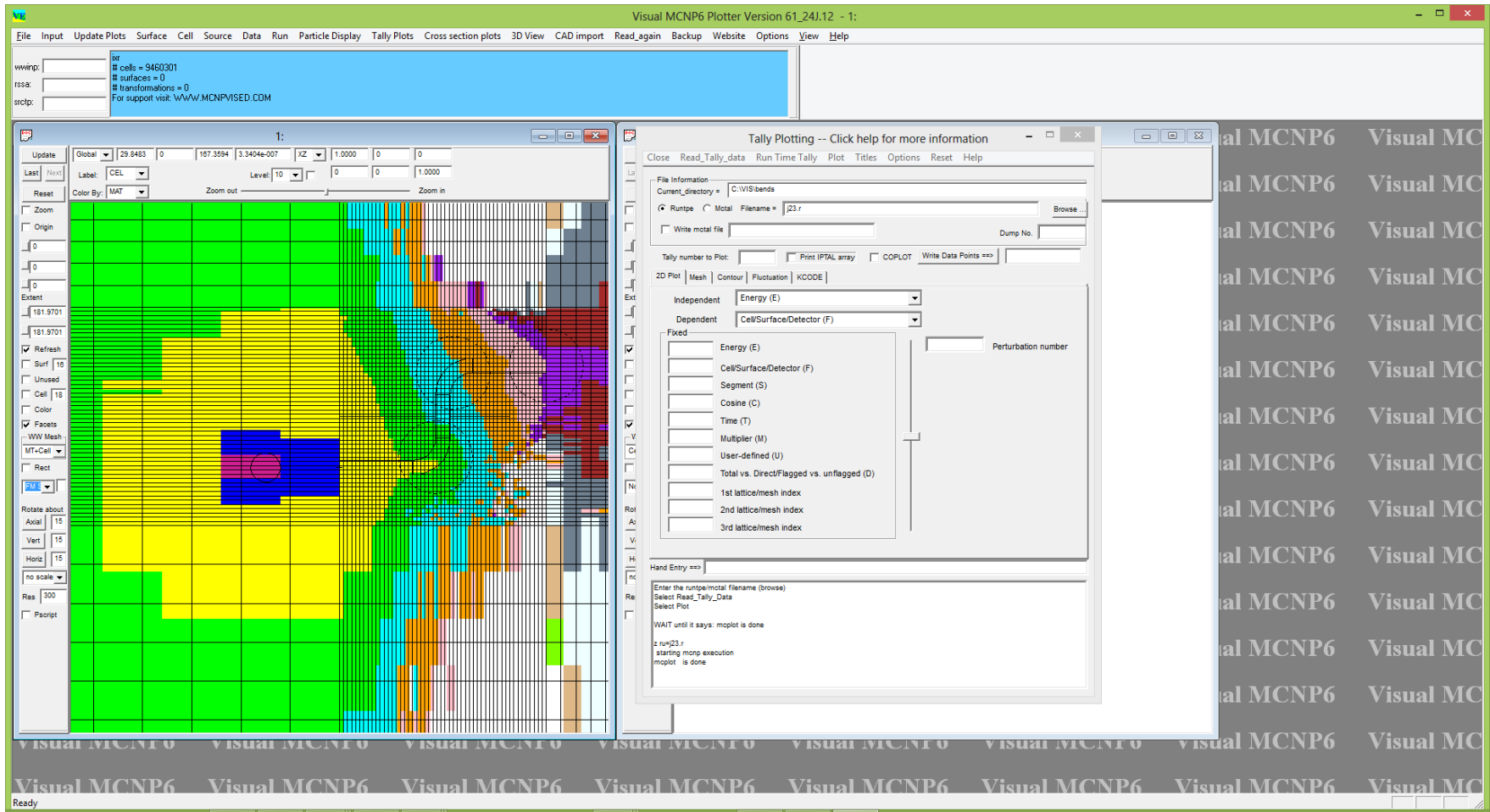
1. Mesh tally data values are displayed
2. All mesh plotting options available as part of the geometry plotter.



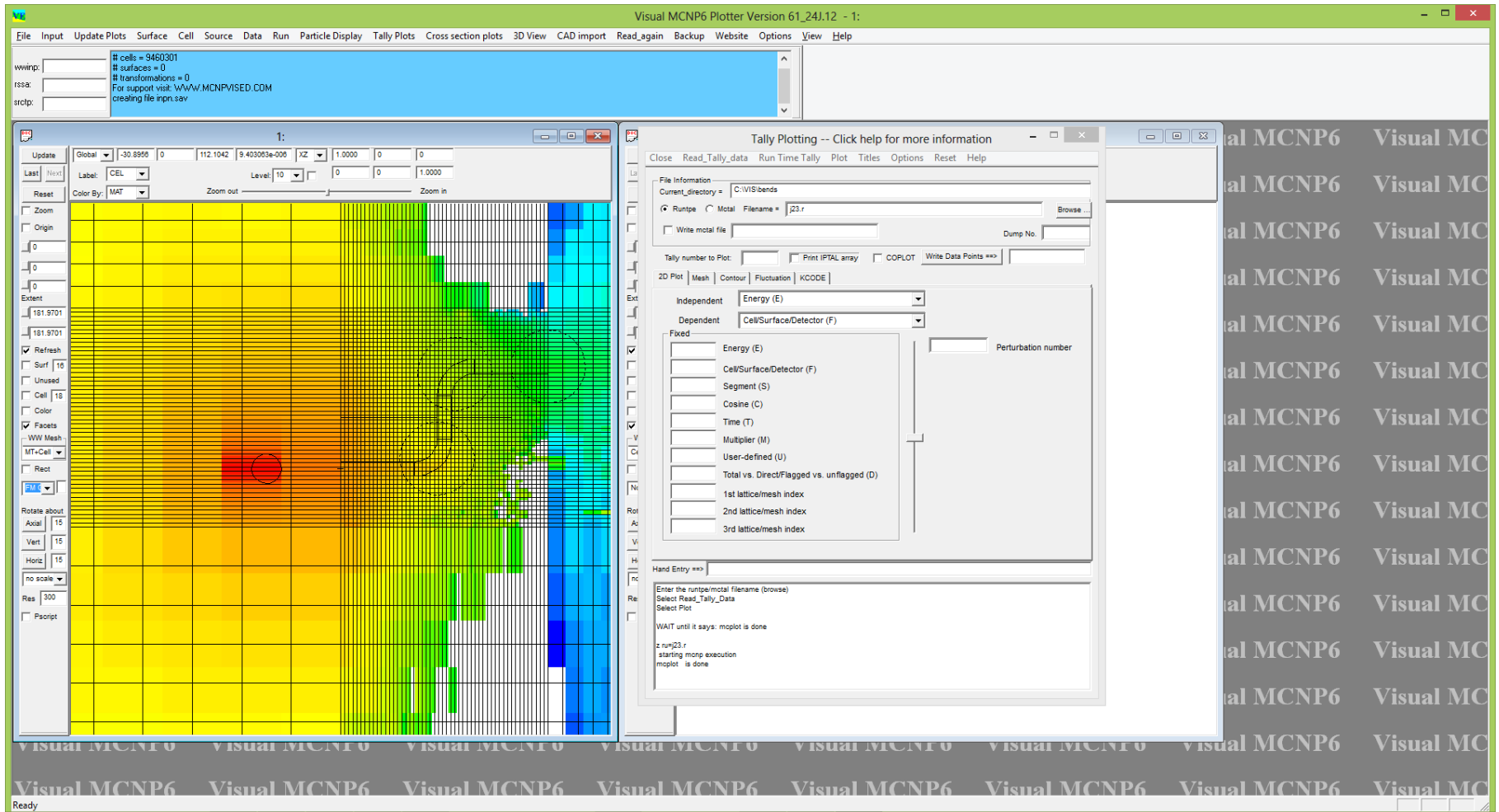
Tmesh Tally Plots



Fmesh Solid Tally Plot



Fmesh Gradient Tally Plot



Weight Window Mesh Plots

