CONVERSION OF COMPUTER AIDED DESIGN (CAD) OUTPUT FILES TO MONTE CARLO N-PARTICLE (MCNP) INPUT FILES

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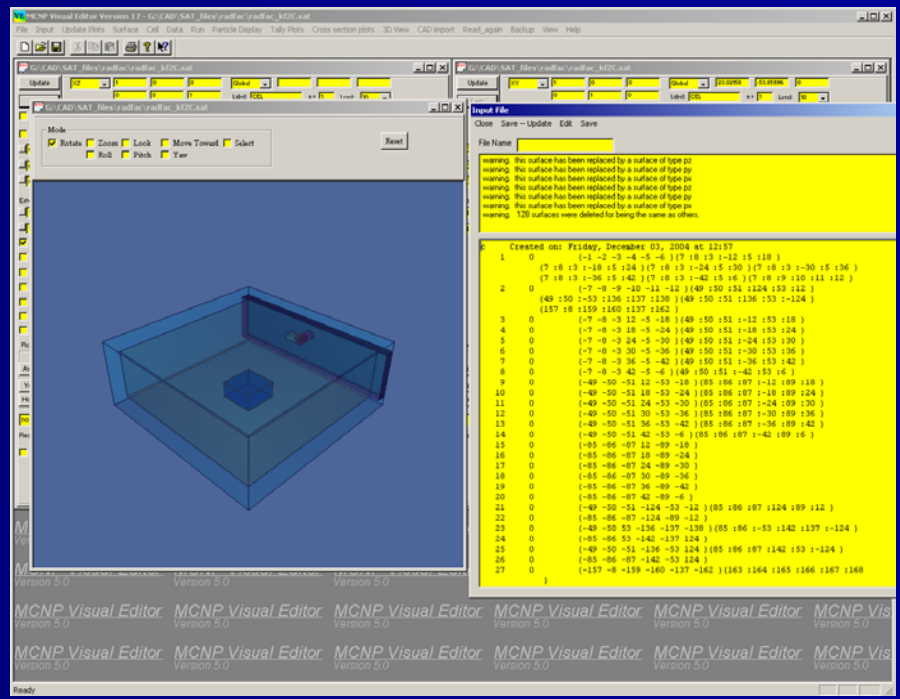
Visual Editor Consultants

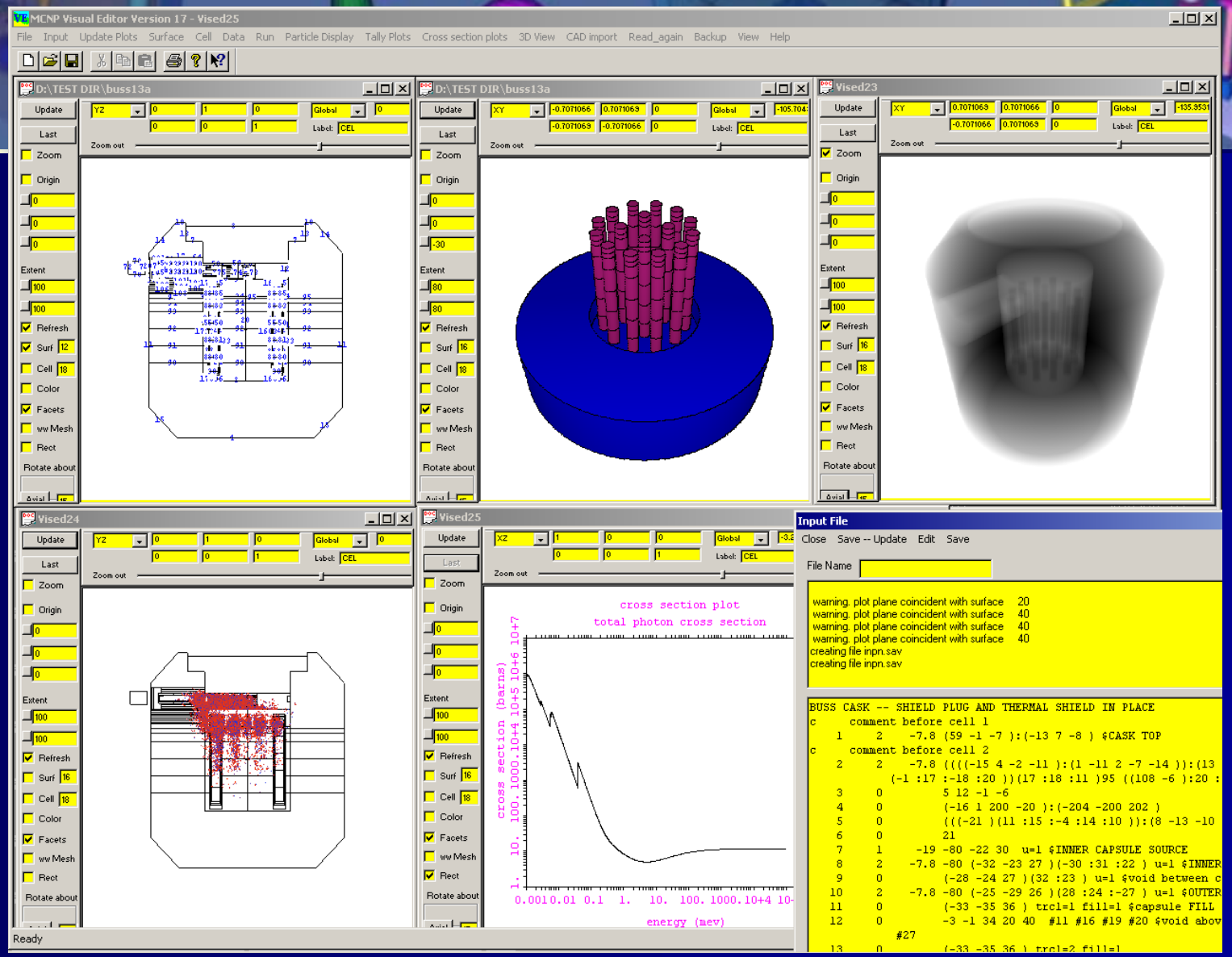
L. L. Carter
Carter M. C. Analysis

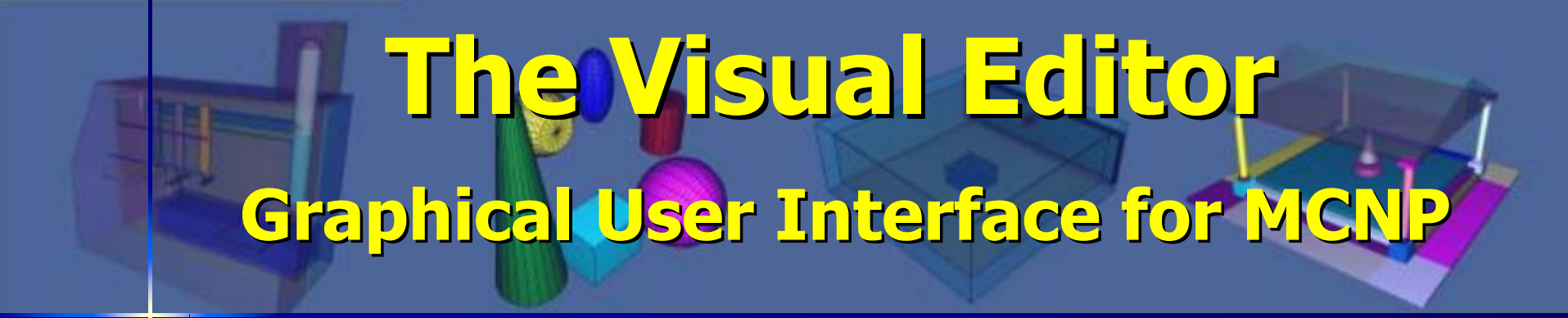


Overview

- Export 2D Drawing eXchange Format (DXF) files from CAD
  - Convert to MCNP using the MCNP Visual Editor
- Export 3D Standard ACIS Text (SAT) files from CAD
  - Convert to MCNP using the MCNP Visual Editor

Complete Interface for MCNP





The Visual Editor

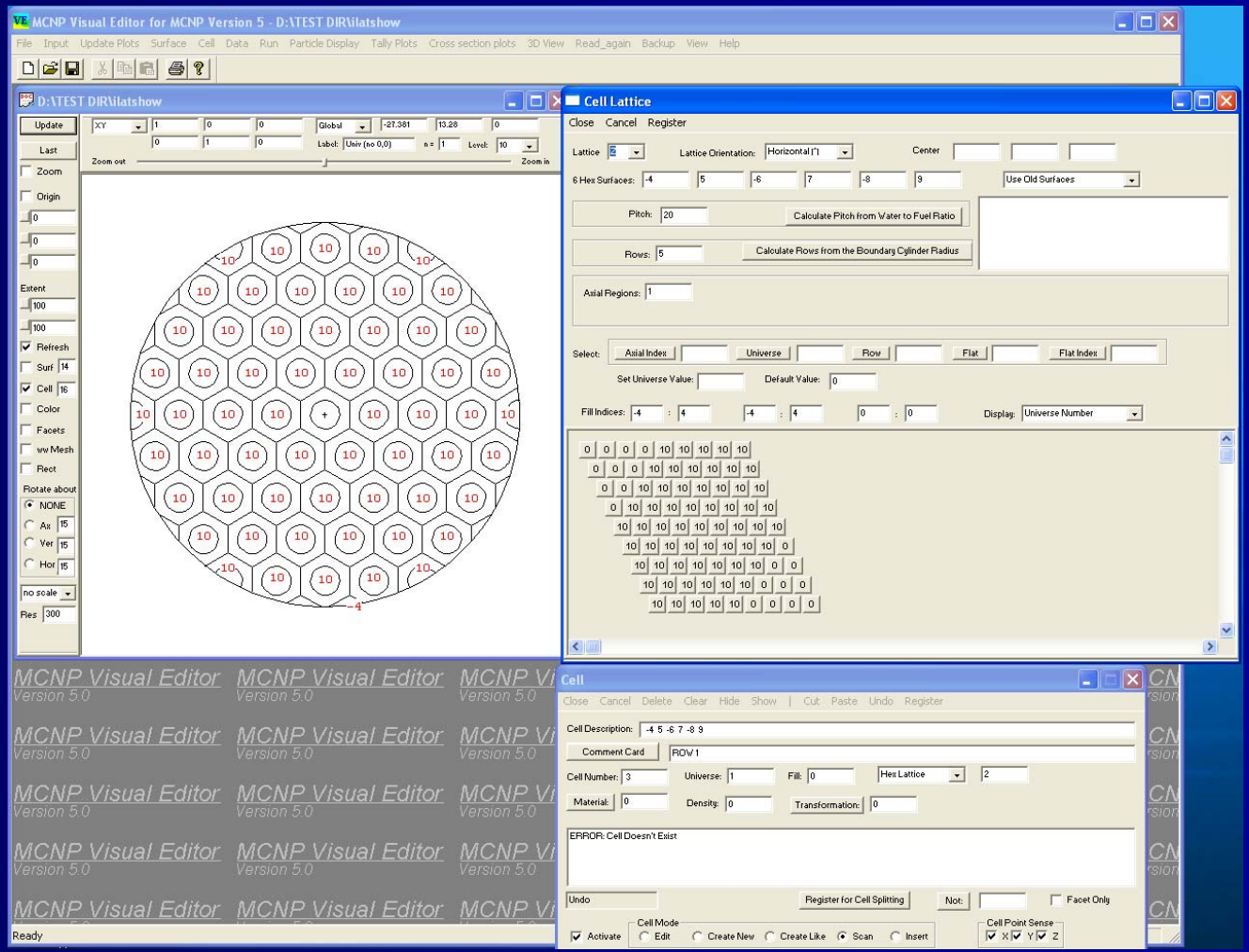
Graphical User Interface for MCNP

- Display Geometries with 2D views
- Create geometries
  - Universes, fills, lattices
- Some support for data cards
  - Materials, transformations, importances
- Plot particle tracks
  - SDEF Source generation points
  - Collision points
  - KCODE source point generation
- 3D plots
  - Normal, Radiograph, Transparent
- Tally plots

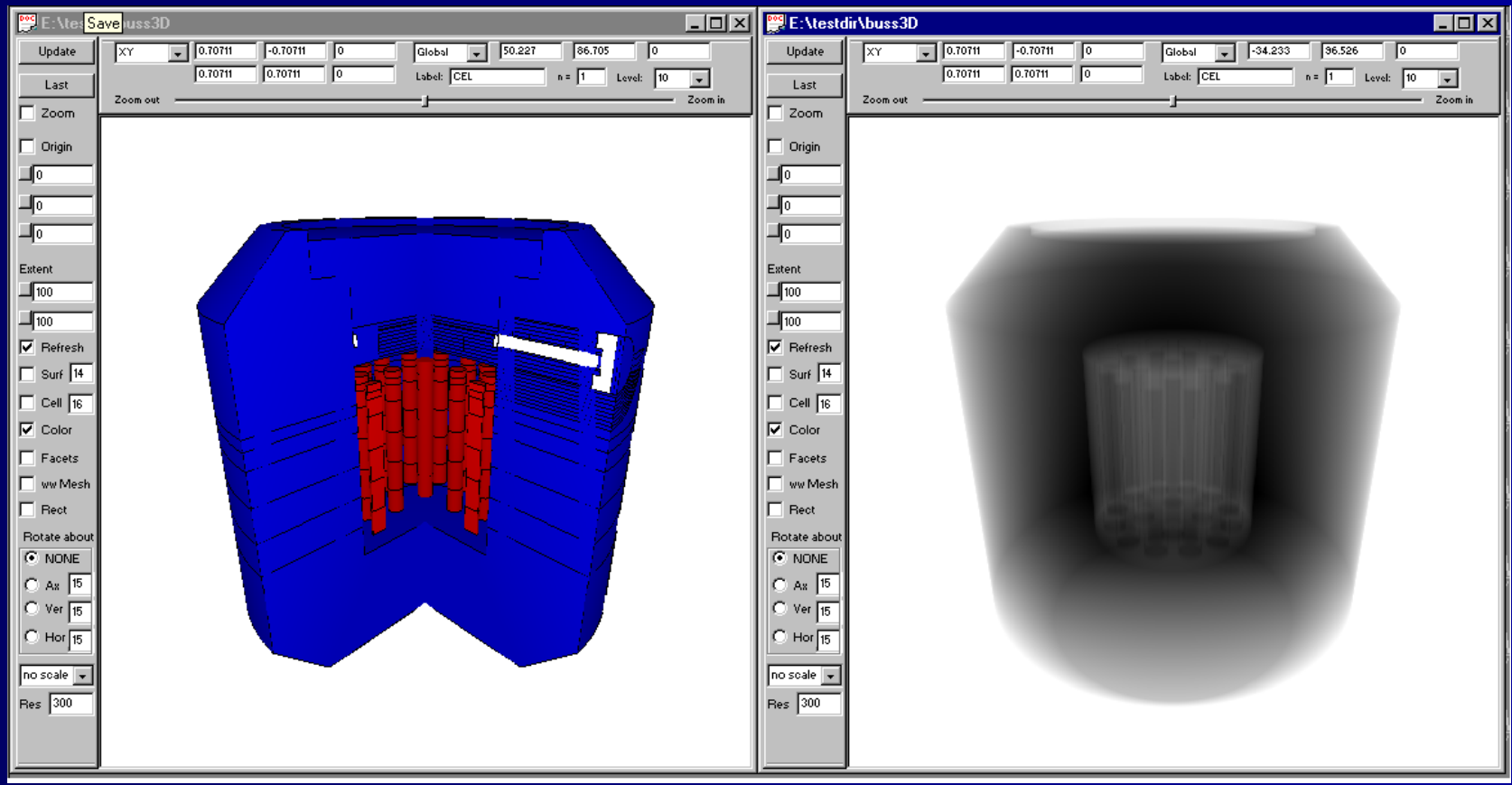
How the Visual Editor works

- Visual C++ code is linked to the MCNP Fortran code.
- The Visual Editor Fortran modifications are now a part of the LANL Version 5 Fortran code.
- The C++ and Fortran share data and memory.

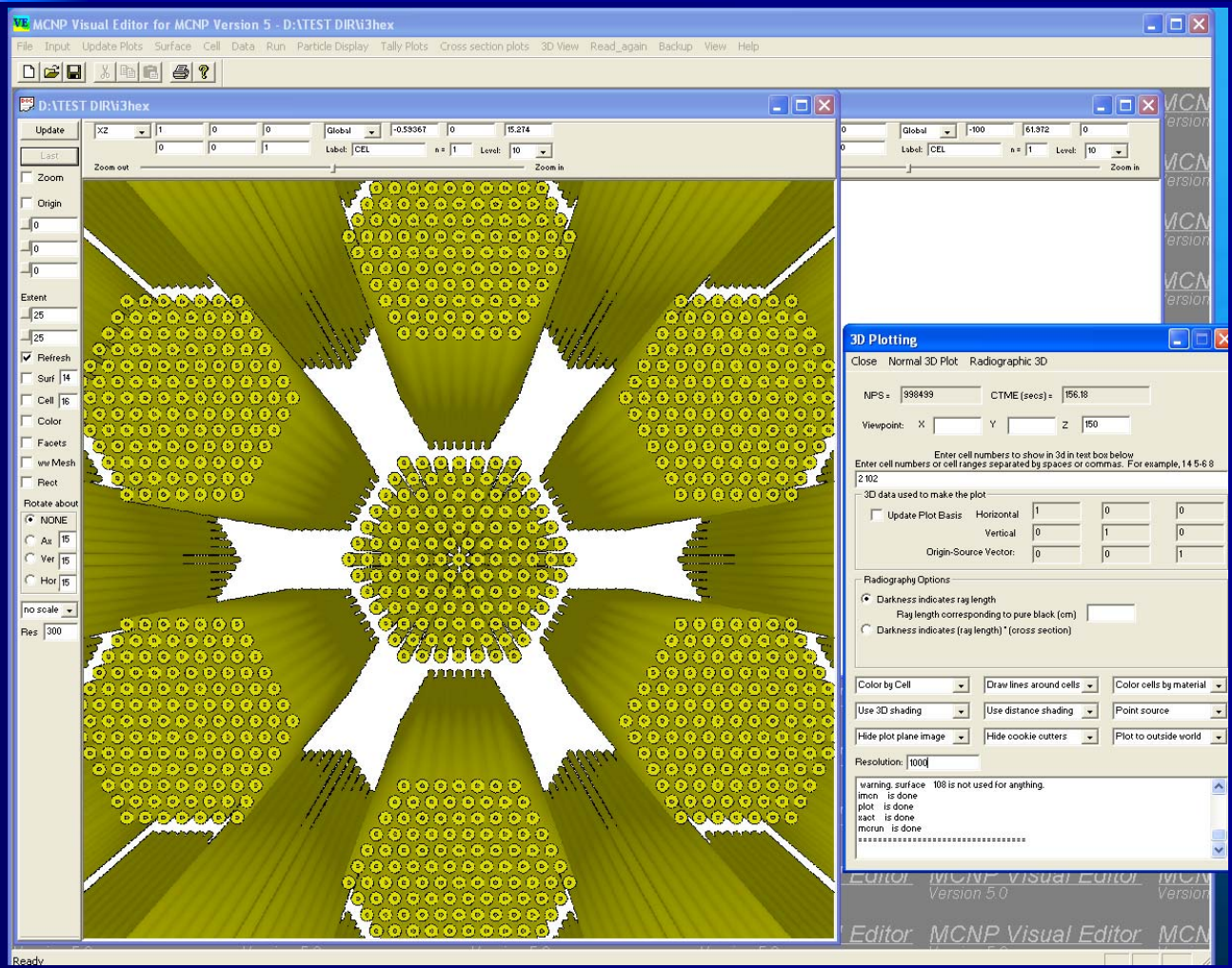
Visual Editor Capabilites
Lattice Display/Creation



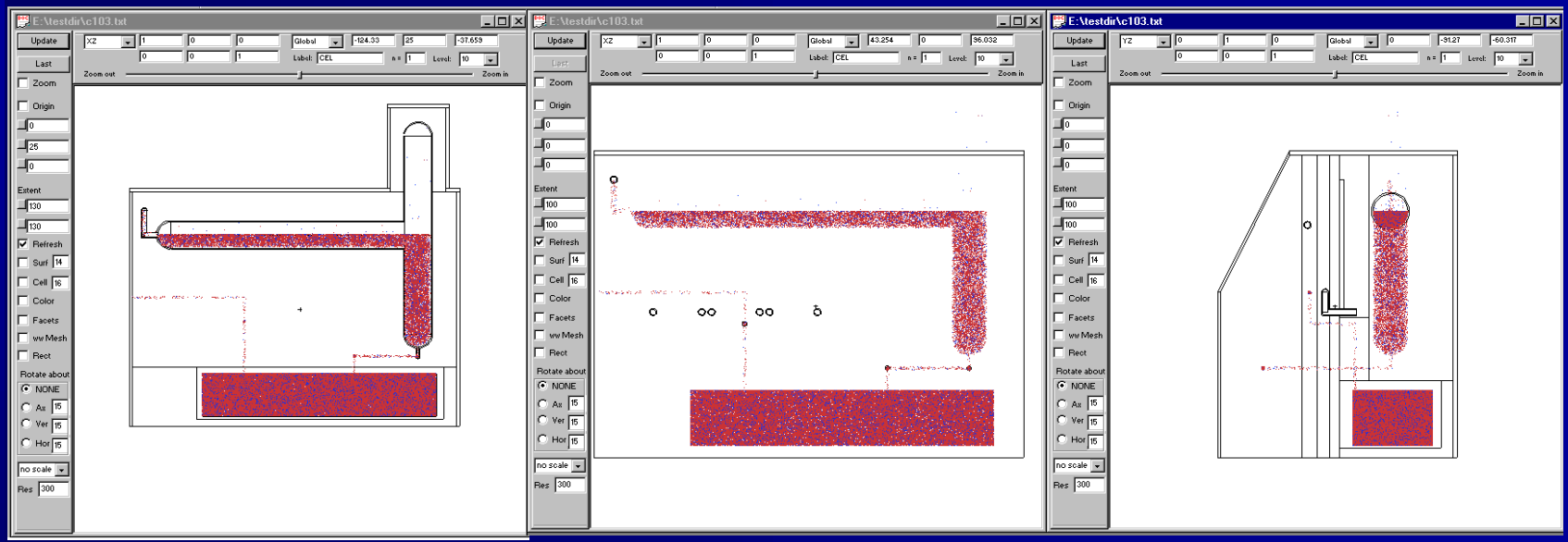
Visual Editor Capabilites
3D Ray Traced Imaging



Visual Editor Capabilites
3D Plots of Lattice Geometries



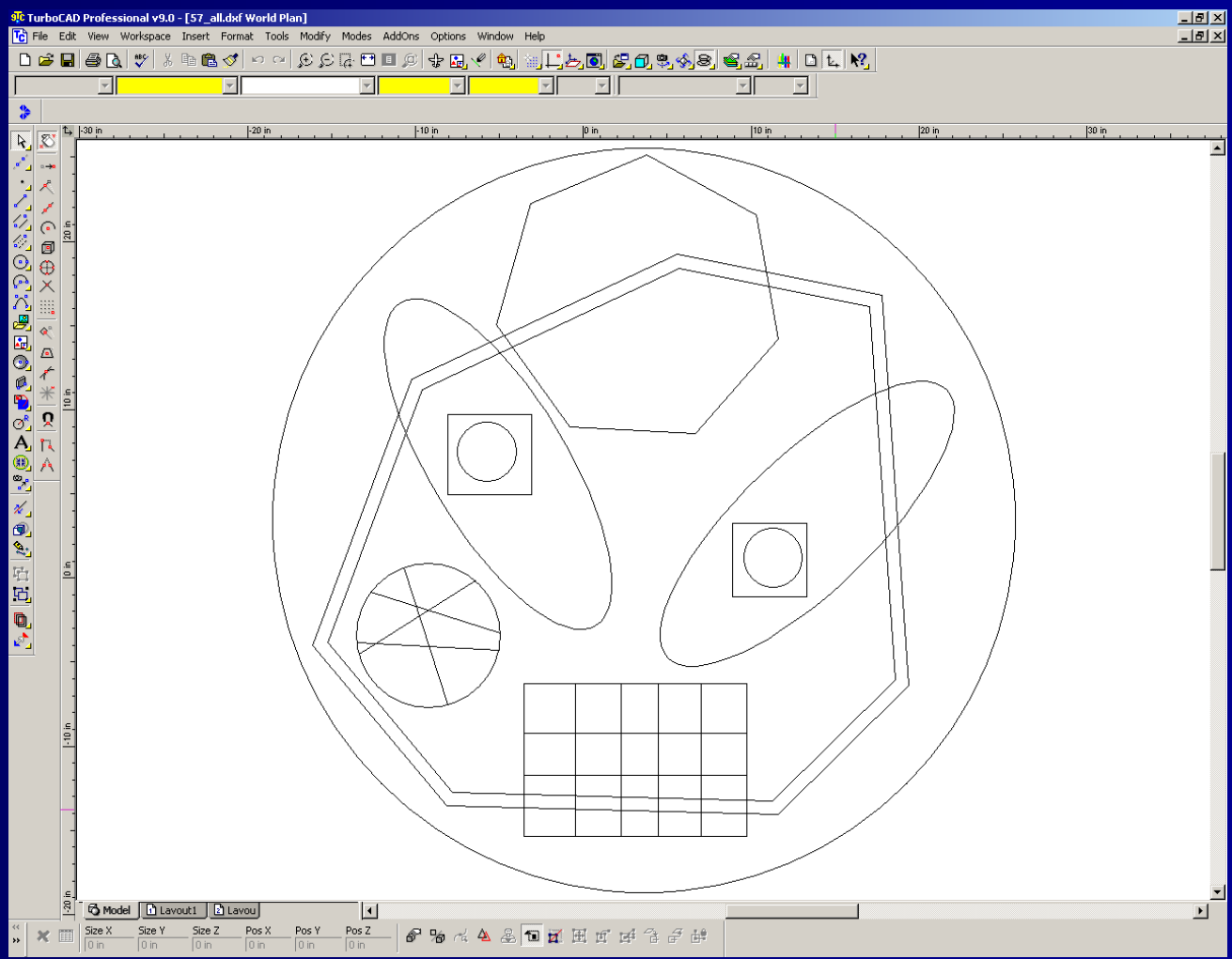
Visual Editor Capabilites
Collision Plots



2D CAD conversion

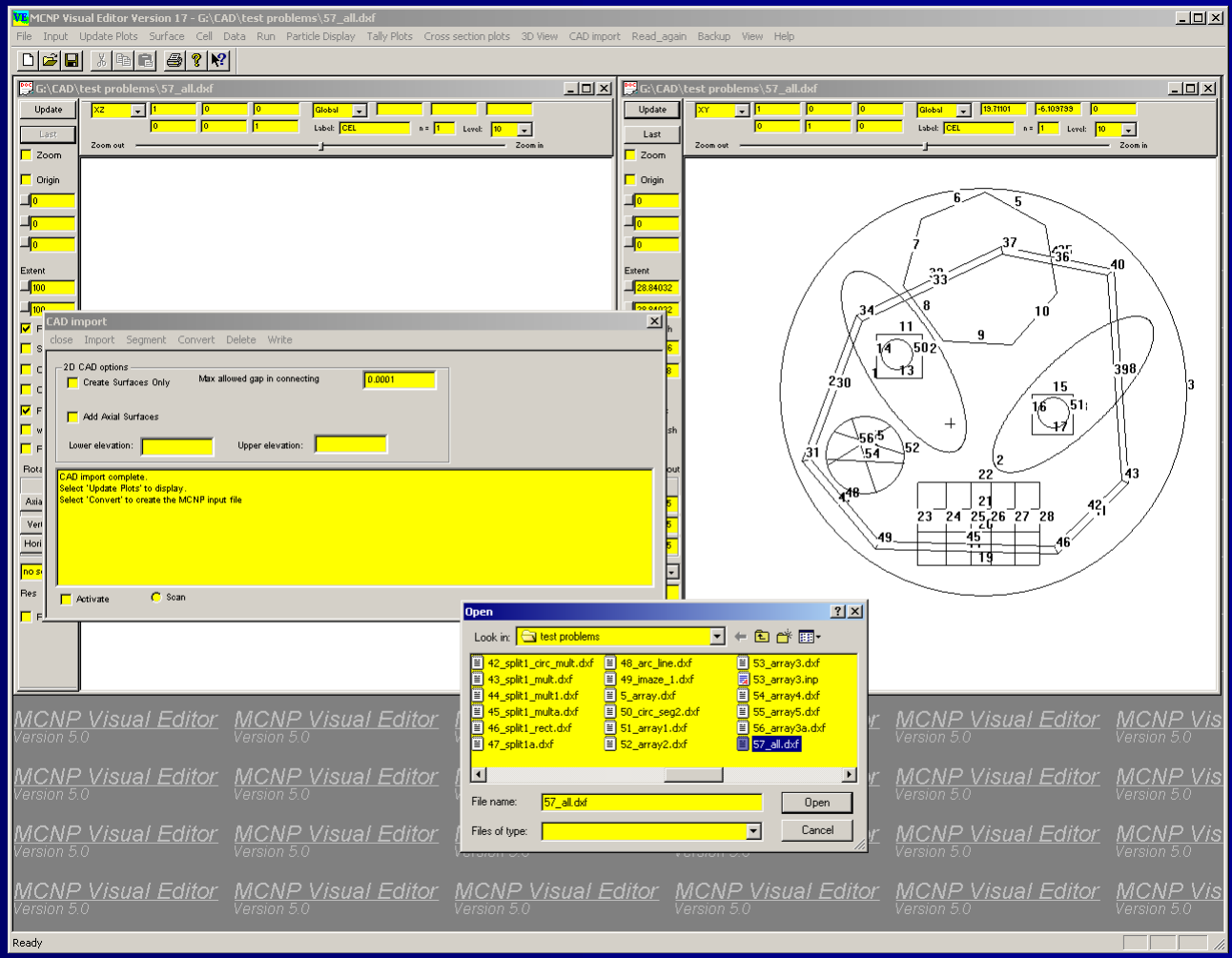
Generate in CAD

Export as a DXF File

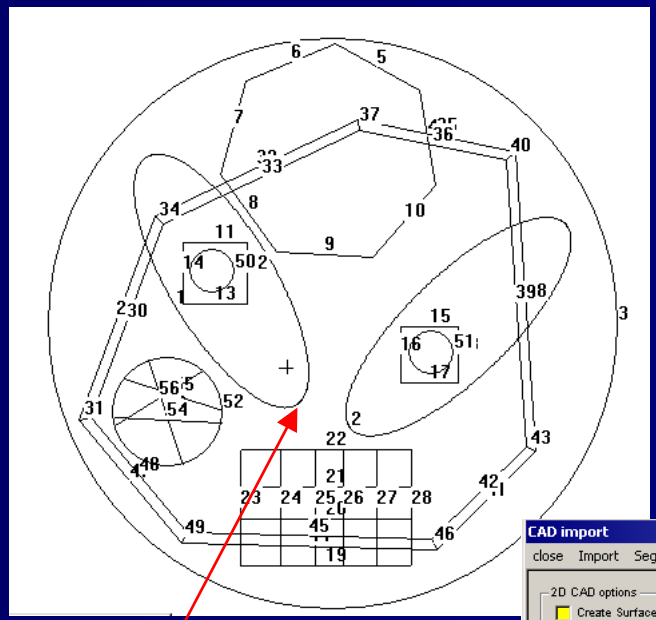


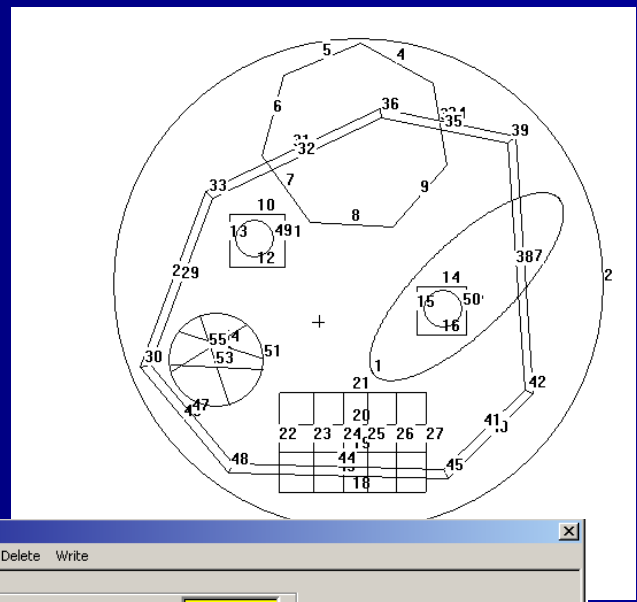
2D CAD conversion

Read 2D dxf File into Visual Editor



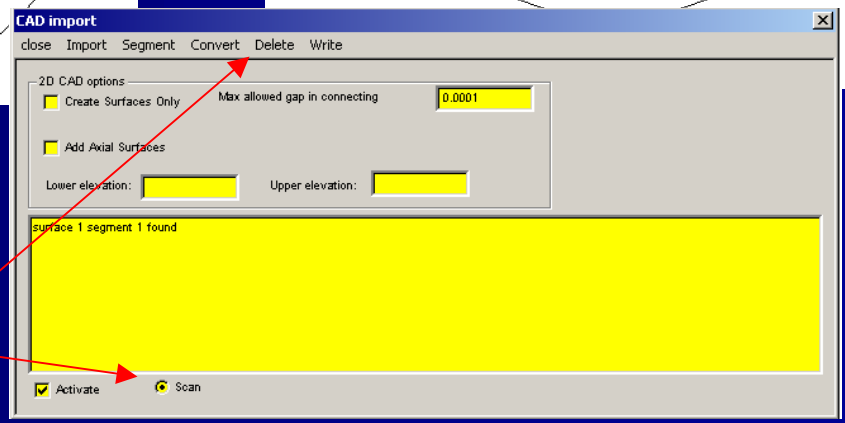
2D CAD conversion
Removed Unwanted Surfaces



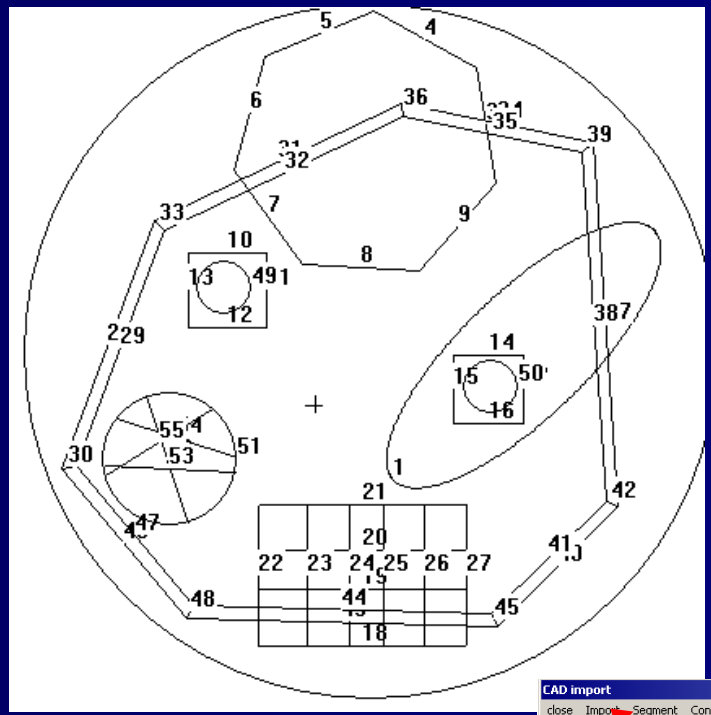


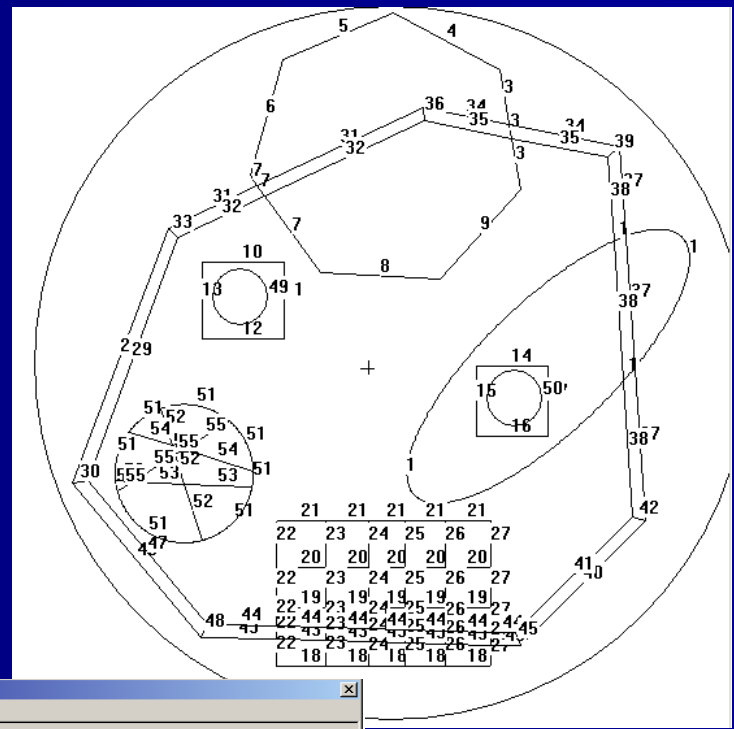
Remove this ellipse

Using Scan-Delete

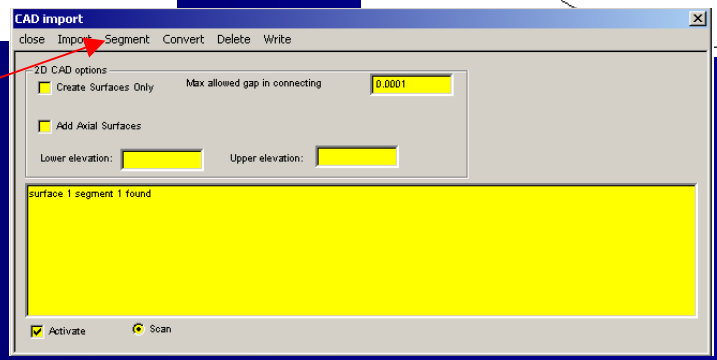


2D CAD conversion
Segment the surfaces



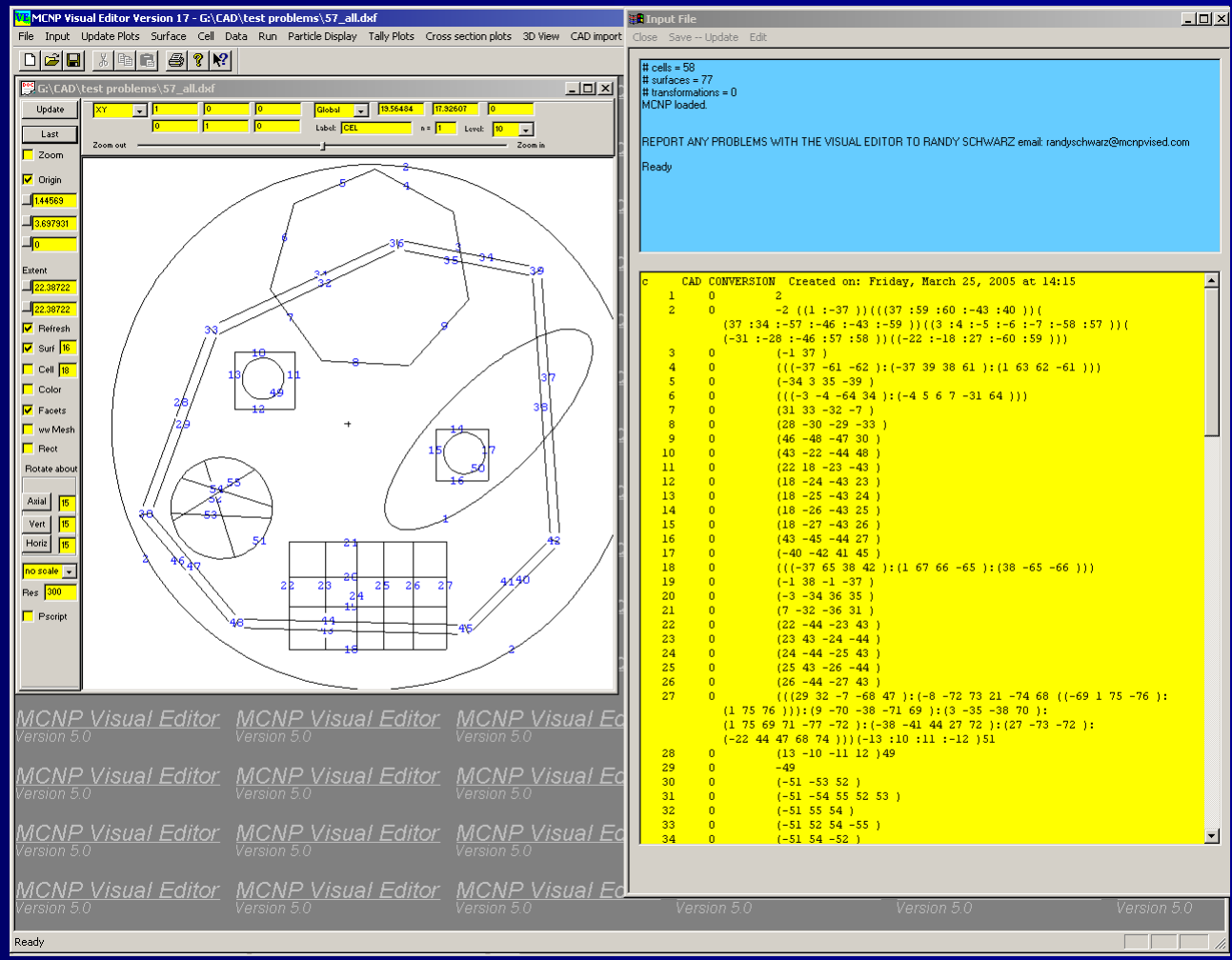


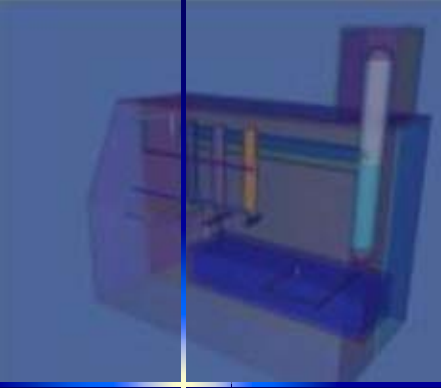
Segment the surface

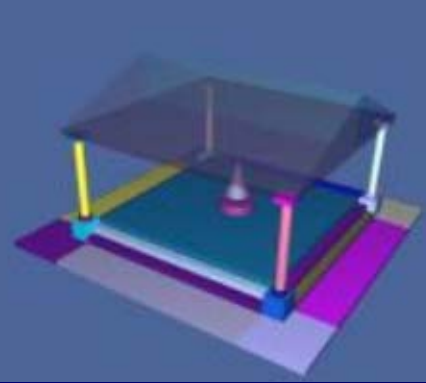


2D CAD conversion

Convert to MCNP







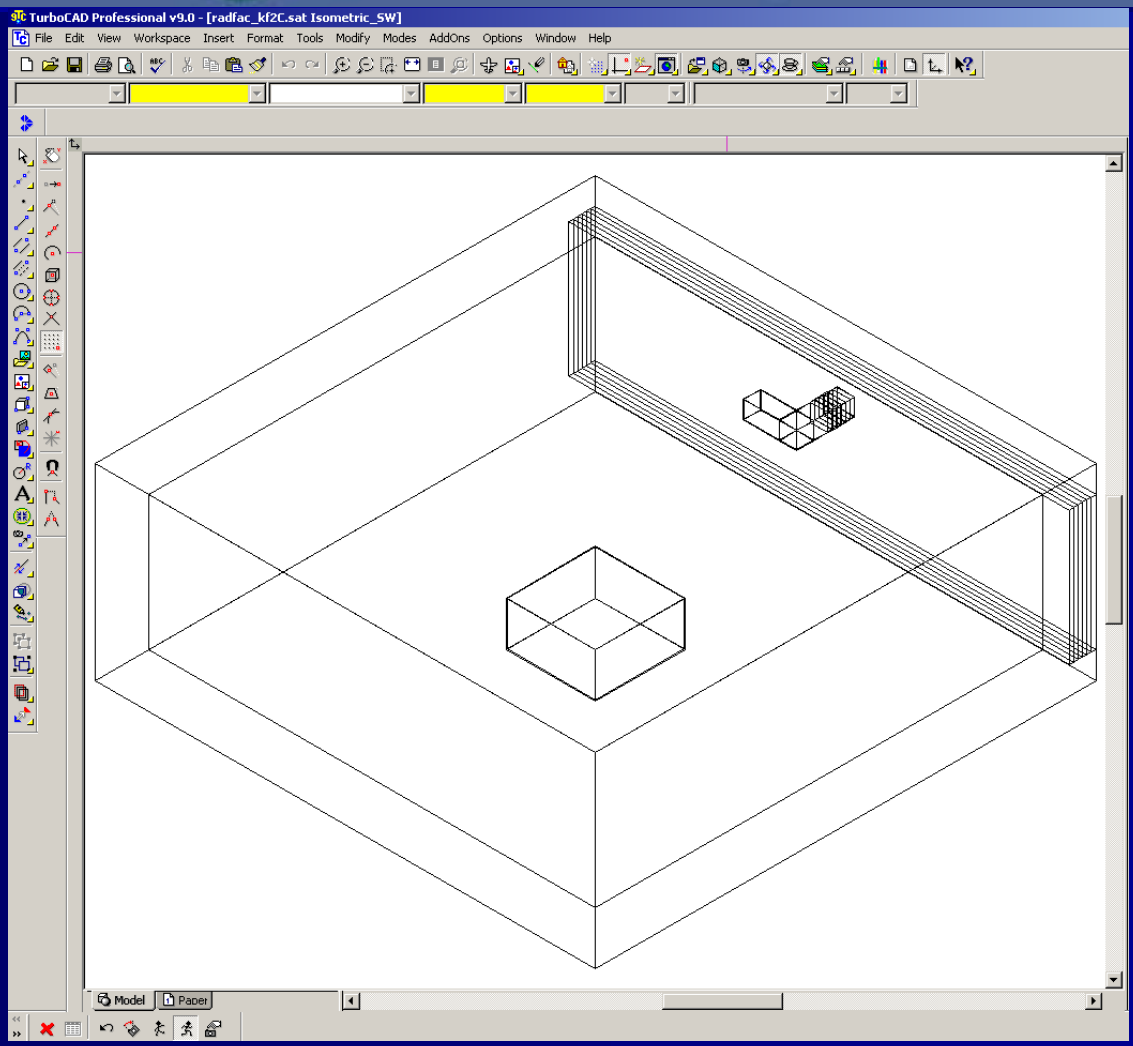
2D CAD conversion
Limitations

- Can not convert intersecting circles/ellipses
- All geometries are extruded axially
- Different geometries have same axial cross section
  - Axial cross section of a cylinder converts to a box.
  - Spheres convert to cylinders.

3D CAD conversion

Generate in CAD

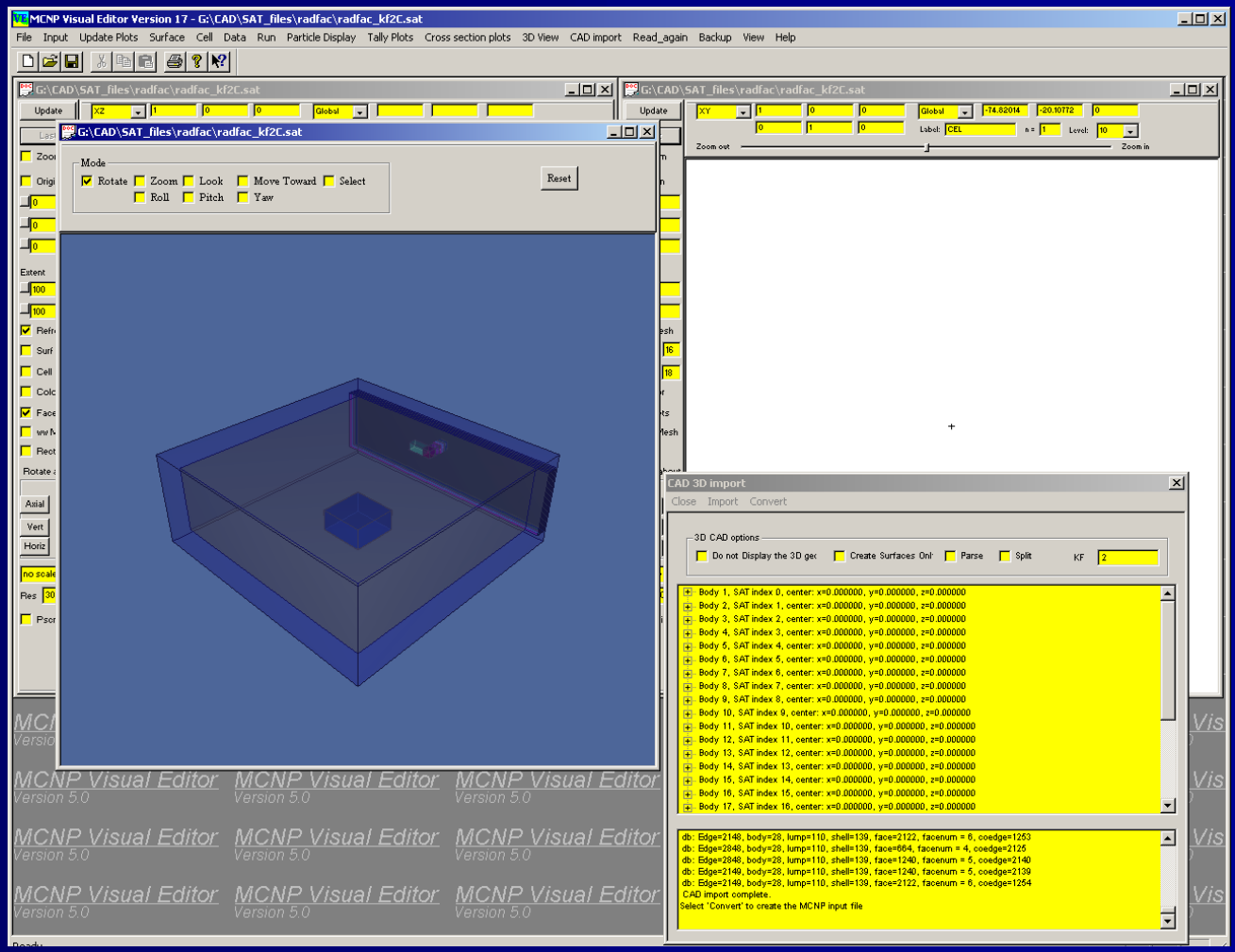
Export as a SAT file



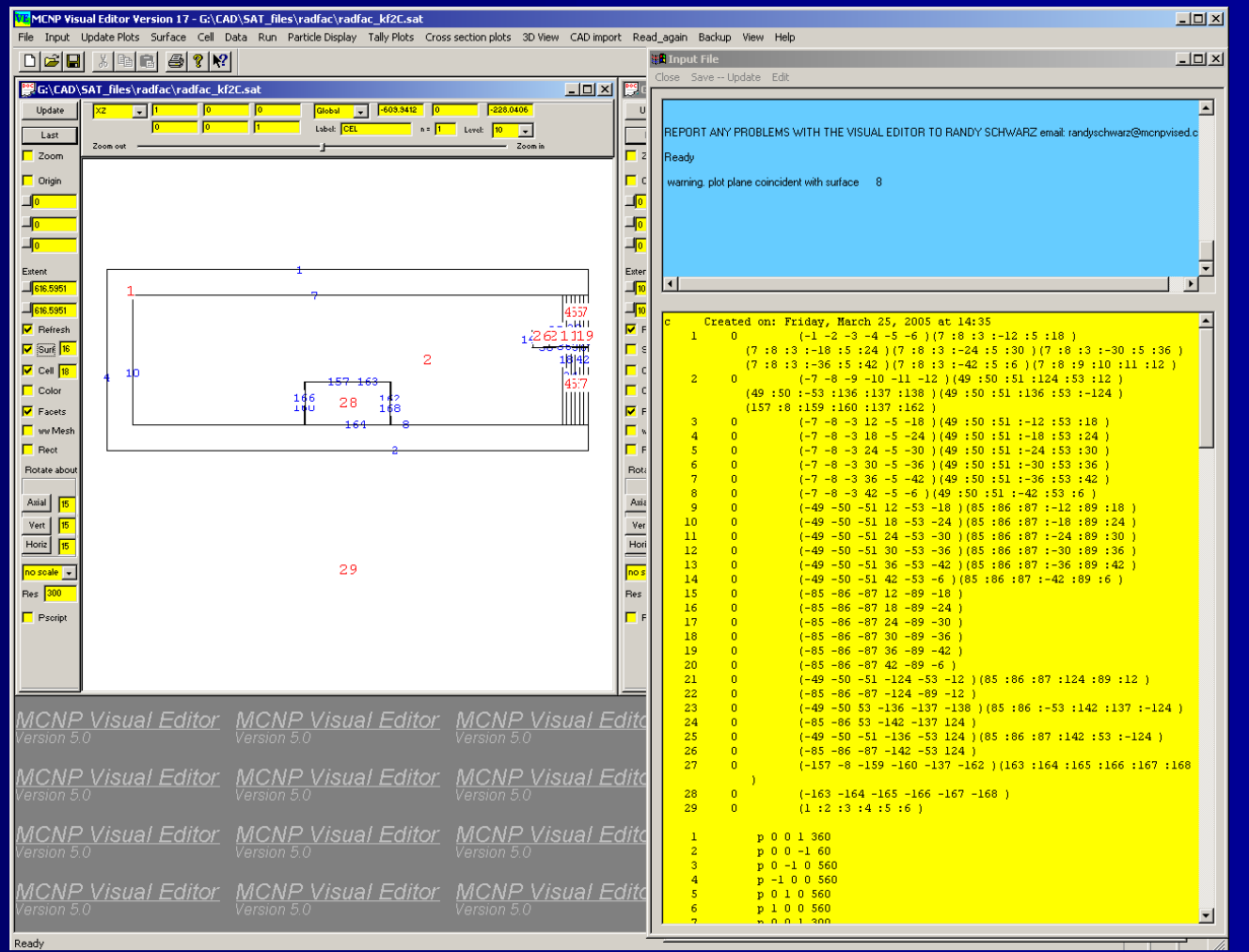
3D CAD conversion

Read SAT File into Visual Editor

3D View of CAD Geometry Displayed

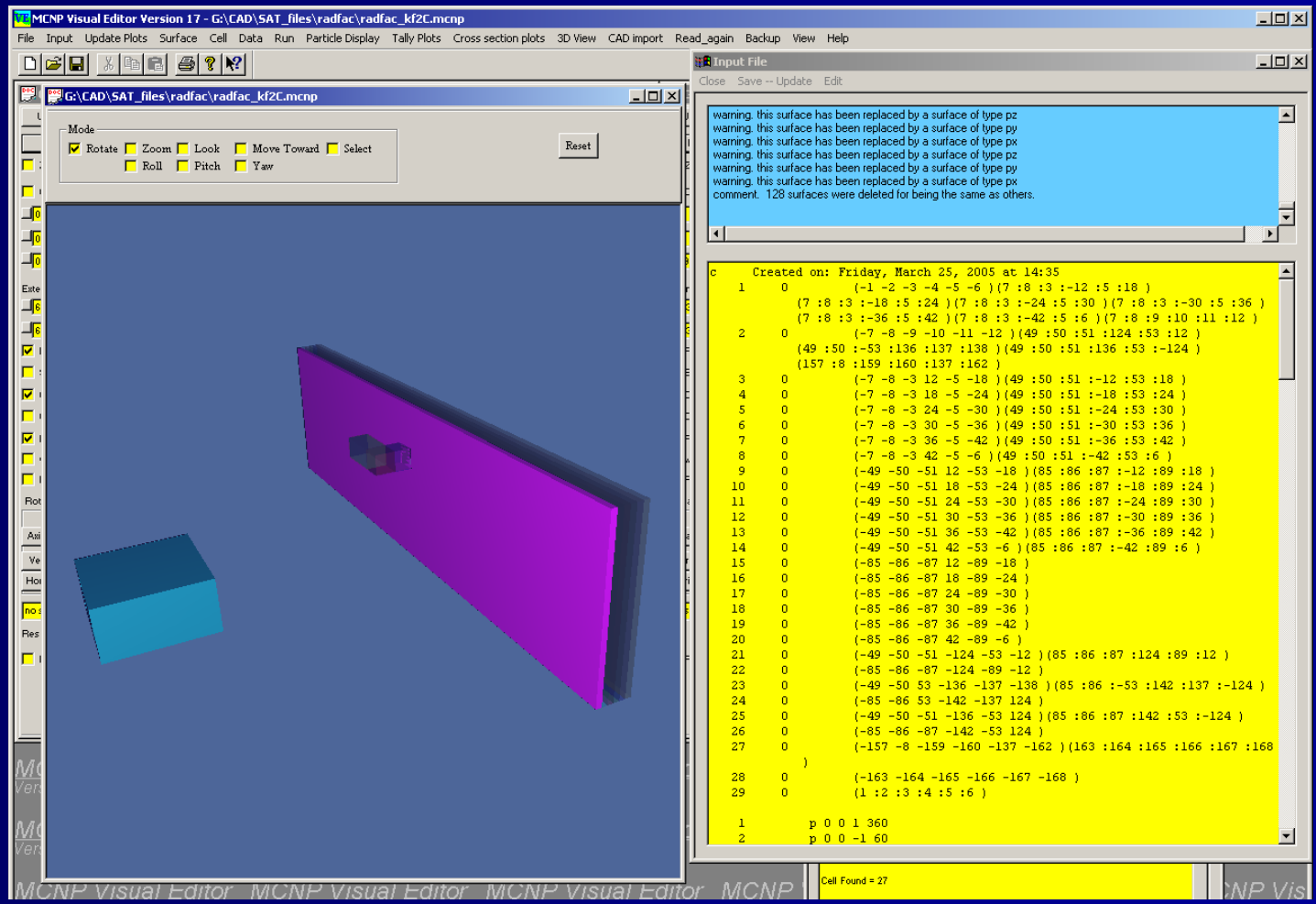


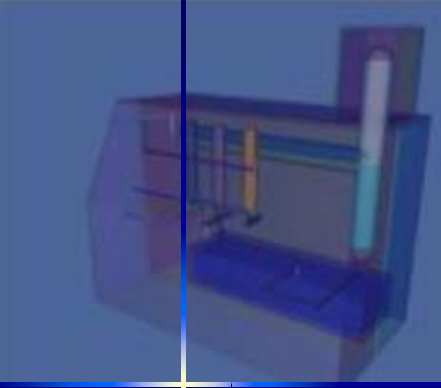
3D CAD conversion
Convert to MCNP

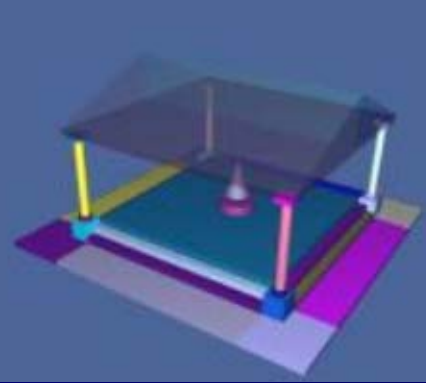


3D CAD conversion

View MCNP Geometry in 3D





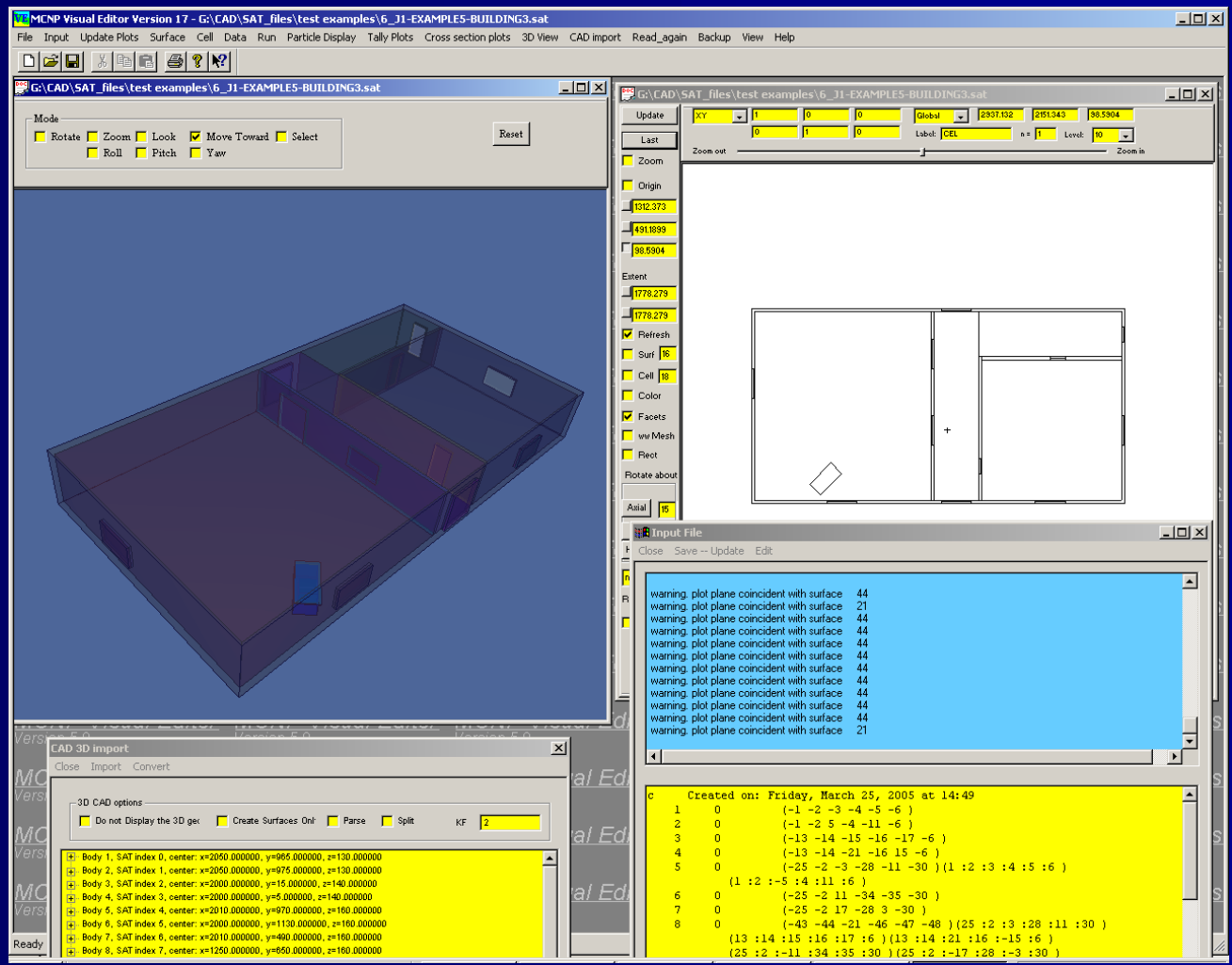


3D CAD conversion
Two Different Modes

- Use CAD to Create the MCNP geometry.
  - Define the geometry without using subtractions or unions
  - Conversion program will determine the subtractions and unions.
- Read an already existing fully defined geometry
  - All space must be defined
  - May need to simplify overly complex cells

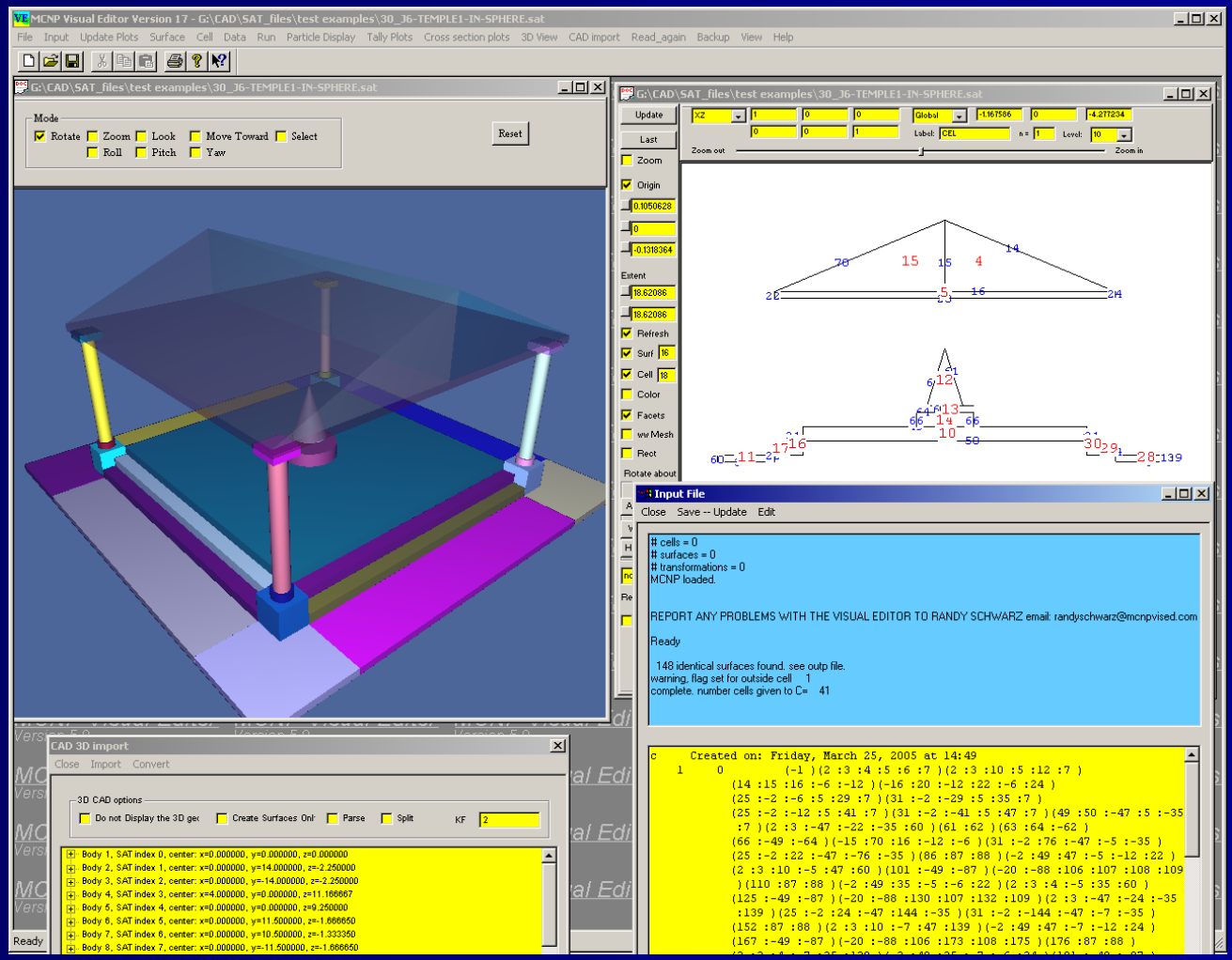
Example 3D CAD conversion

Building



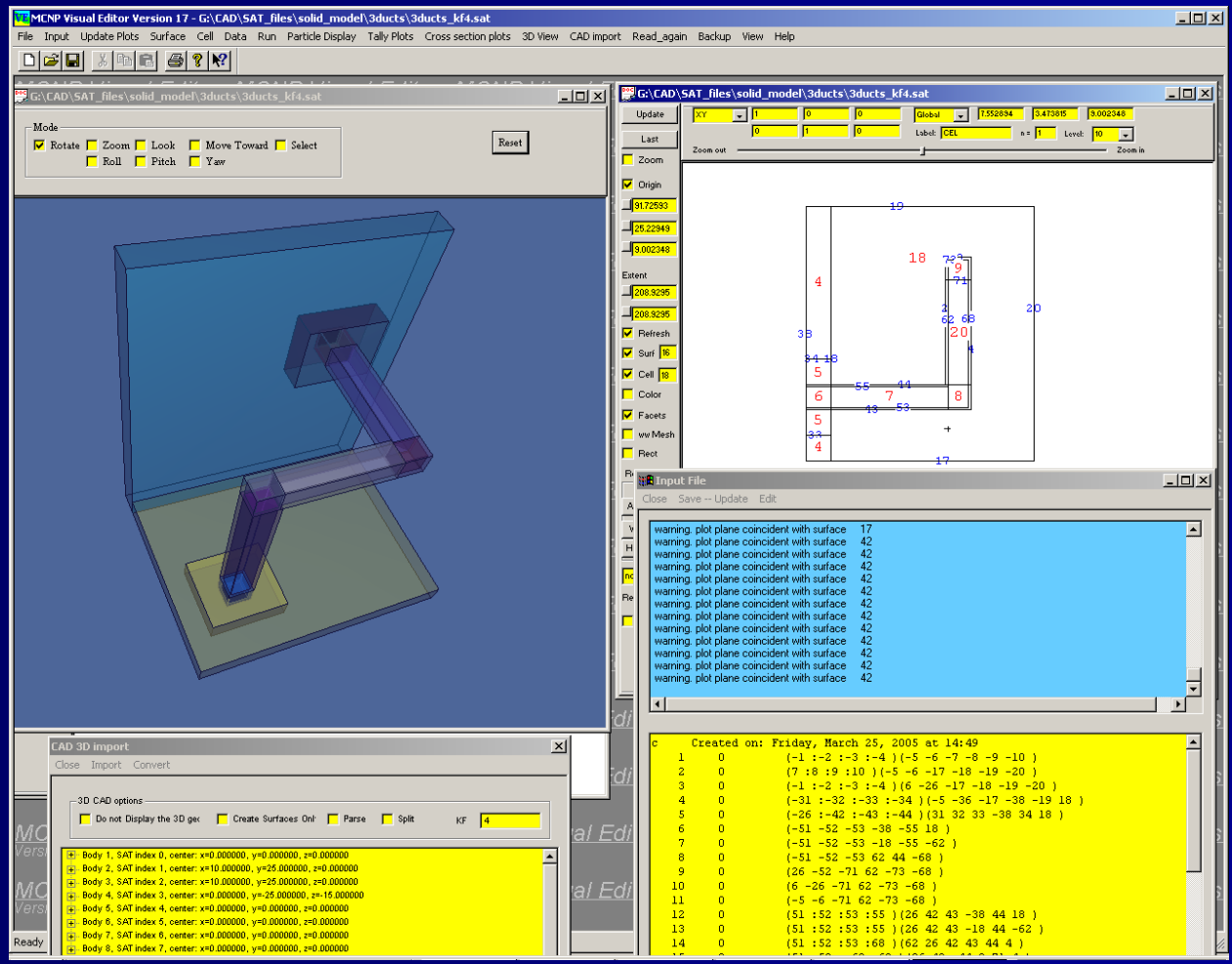
Example 3D CAD conversion

Building



Example 3D CAD conversion

Duct with 3 Bends



Request for Test Geometries

- Test 2D and 3D conversion on complex geometries.
  - Send geometries to Randy Schwarz

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