GiD v11 news

GiD developer Team

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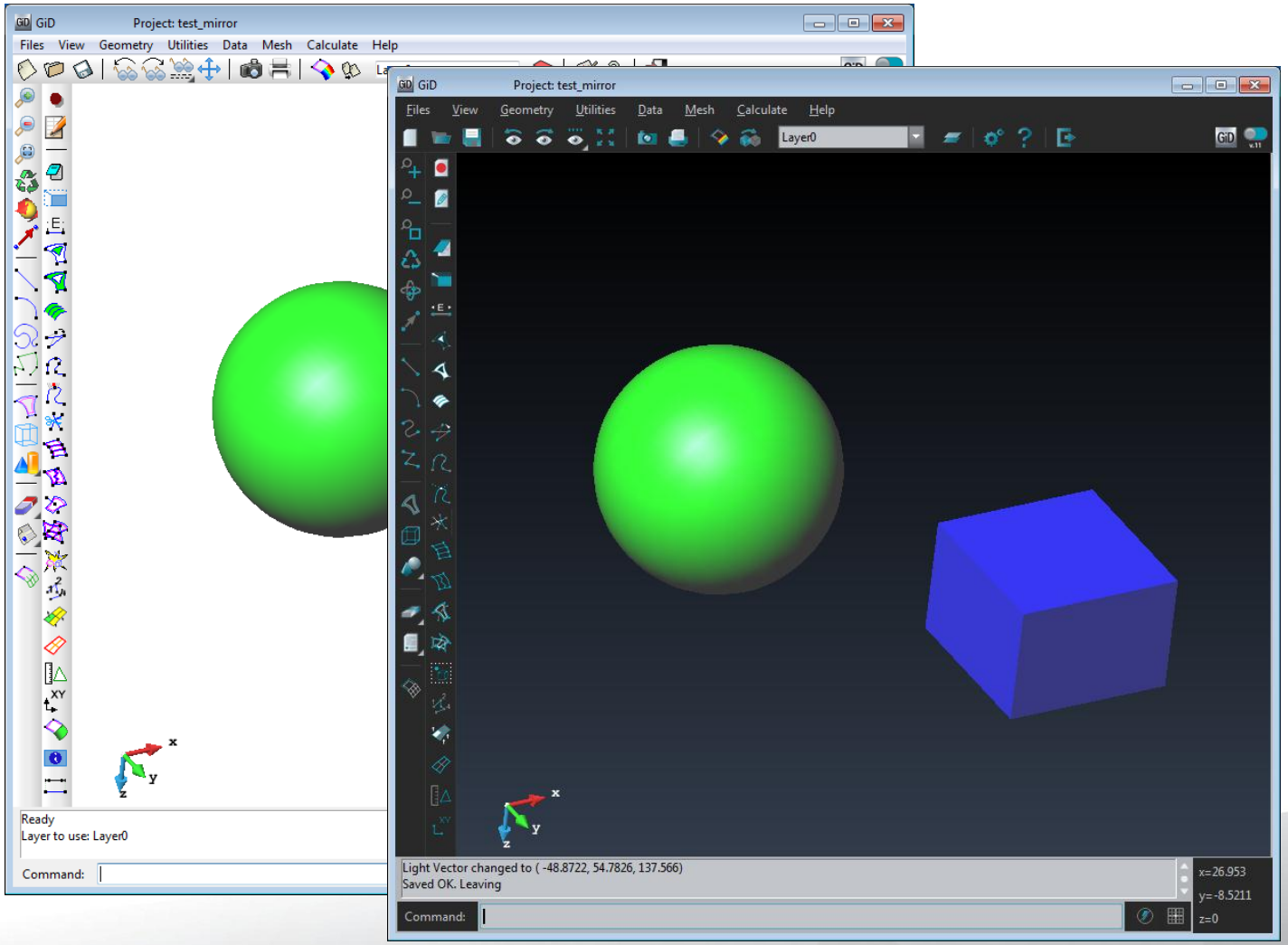
New look for the GUI

User can choose between Classic and Dark themes, which change drastically the GUI appearance.



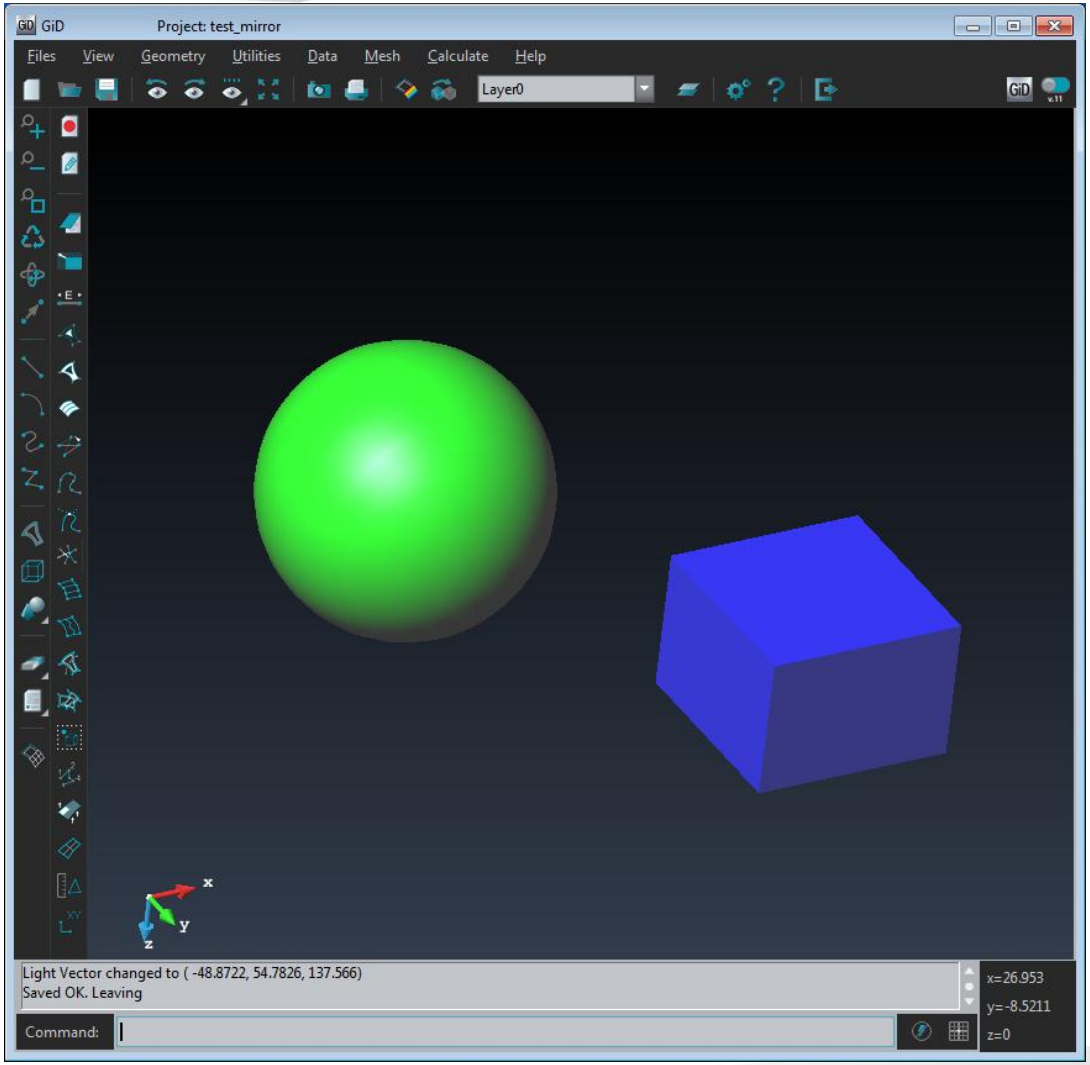
Advantages of Dark theme:

Windows and icons look unified.

Professional-cool look that makes GiD more appealing for new users.

Same look regardless of the platform (linux, windows, MAC) or colours theme of each user.

New look for the GUI



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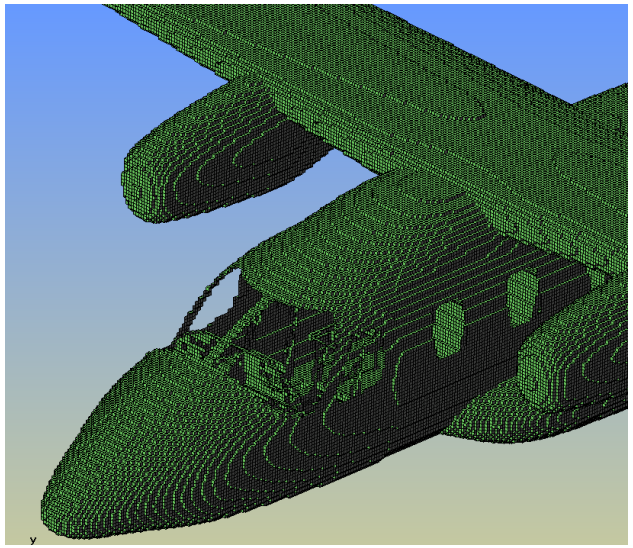
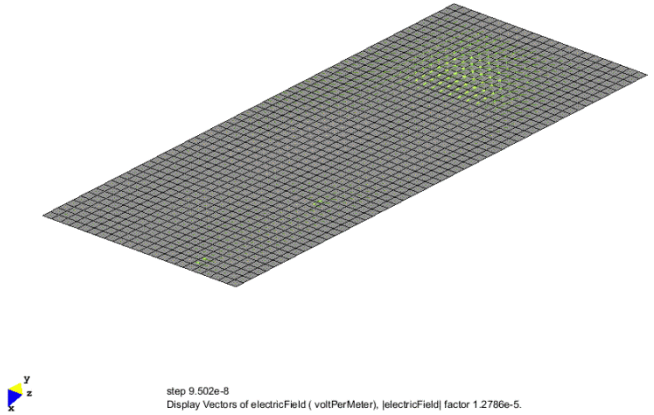
Import/export

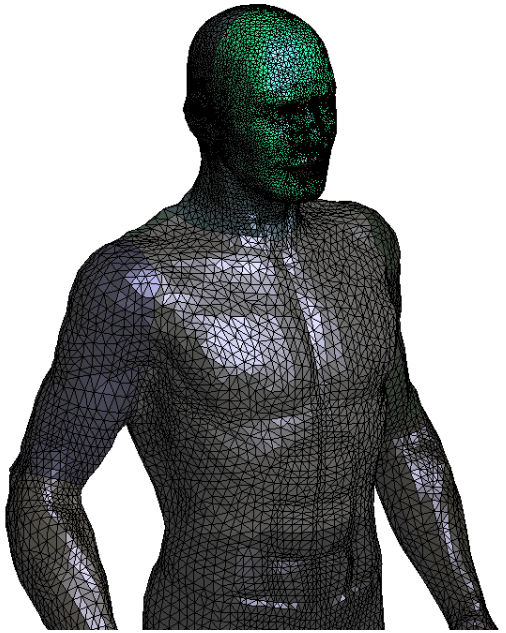
- EMA3D (CadFix) cartesian mesh import
- Amelet mesh and results import/export (pre and post)
- STAR-CD mesh import



CadFix cartesian surface mesh



Amelet cartesian mesh and results



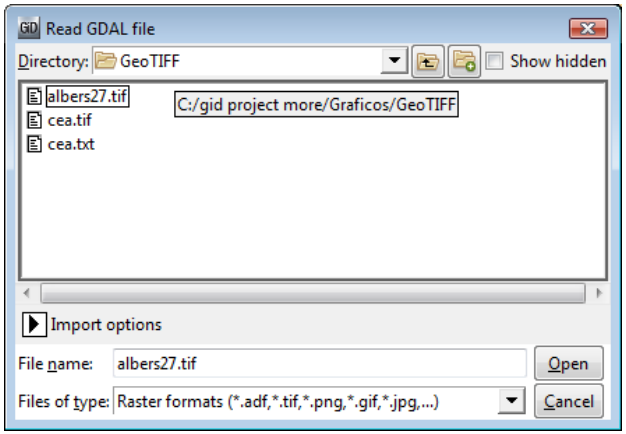
STAR-CD unstructured mesh

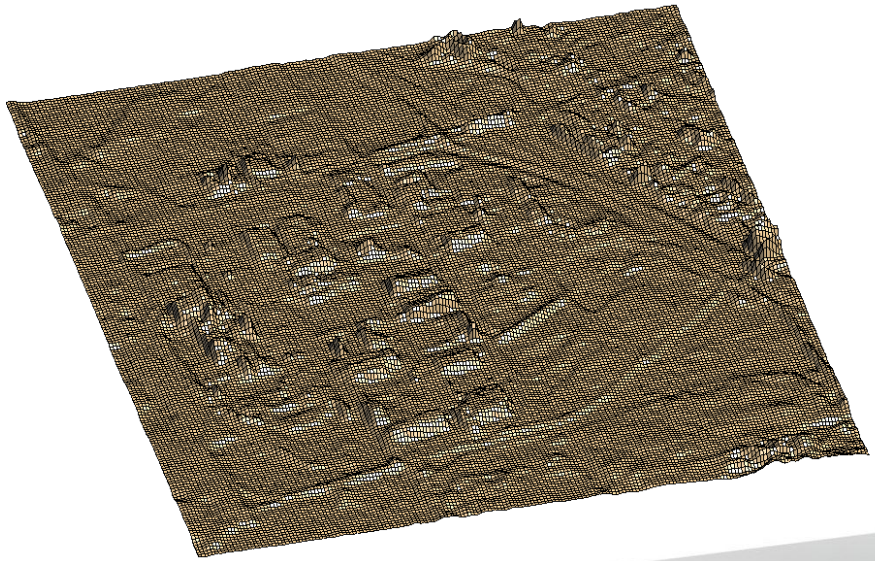
These importers are implemented as Tcl plug-ins

GDAL import

Plug-in to import raster files as geometry or mesh.

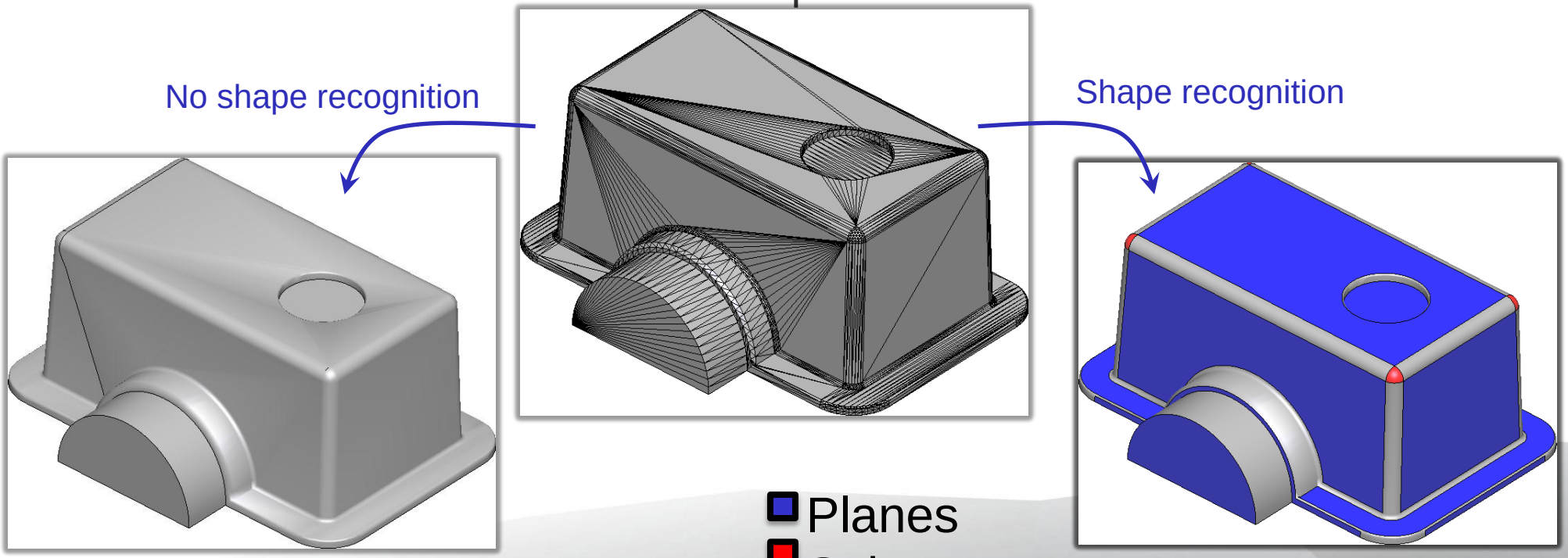
To read and write GIS digital terrain models from multiple formats (Arc/Info, tiff, and most image formats).





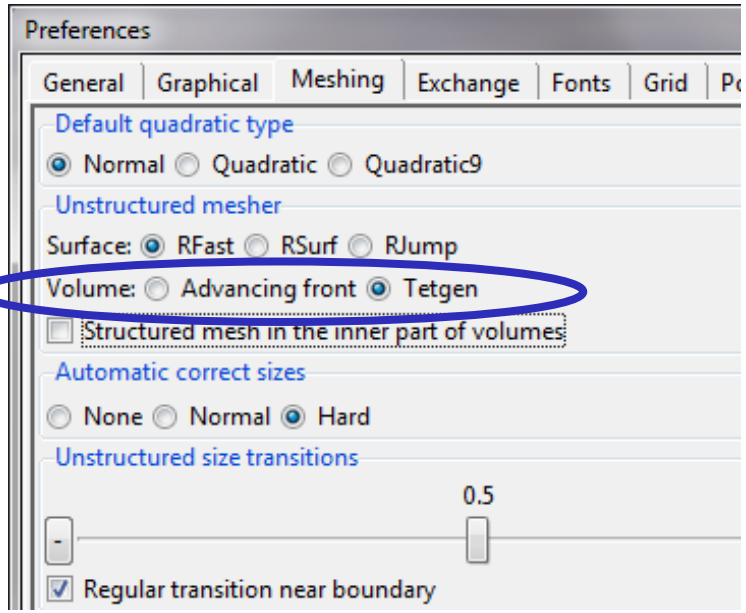
Shape recognition

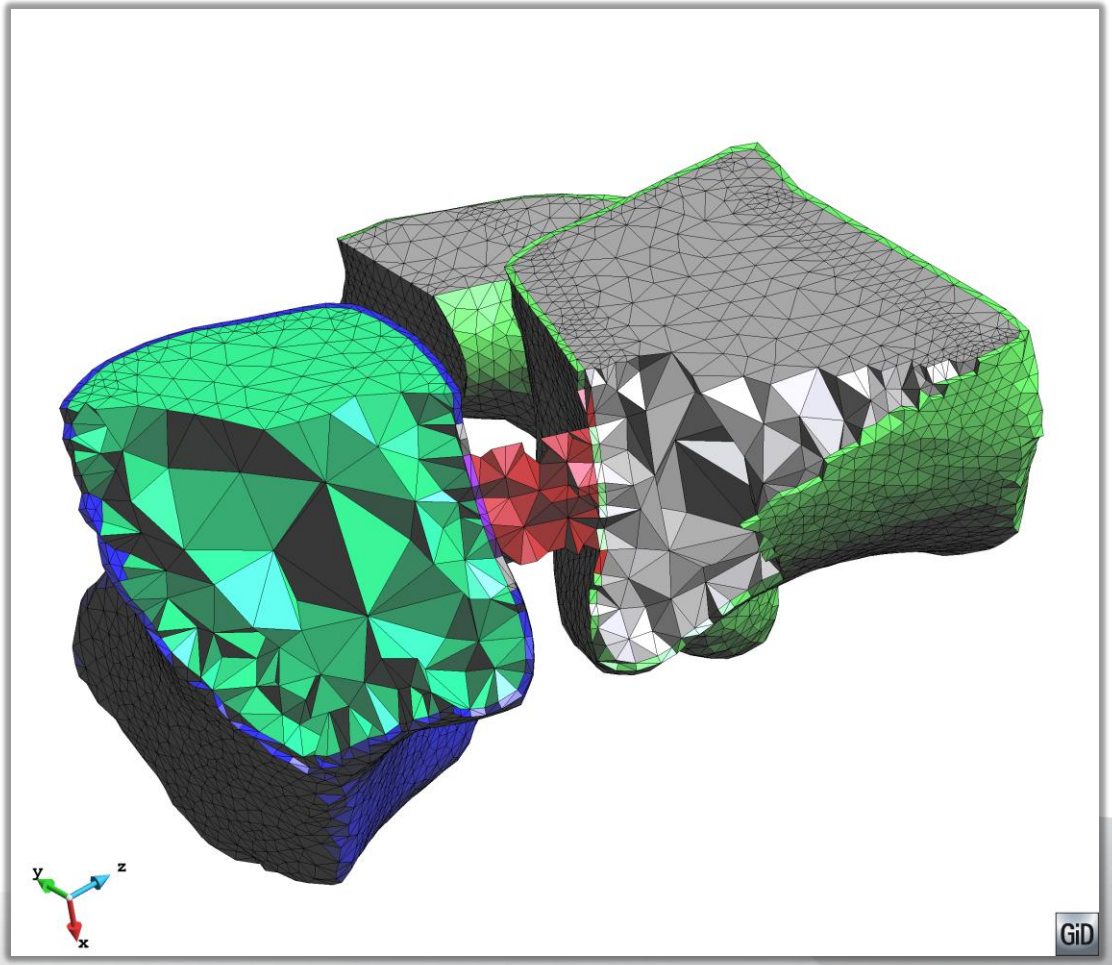
- Process for reconstructing geometry from mesh
  - Create patches of surface elements separated by sharp edges
  - Separate automatically independent patches following recognizable shapes (planes, spheres, etc…)
  - Create NURBS from elements patches



Tetgen mesher inside GiD

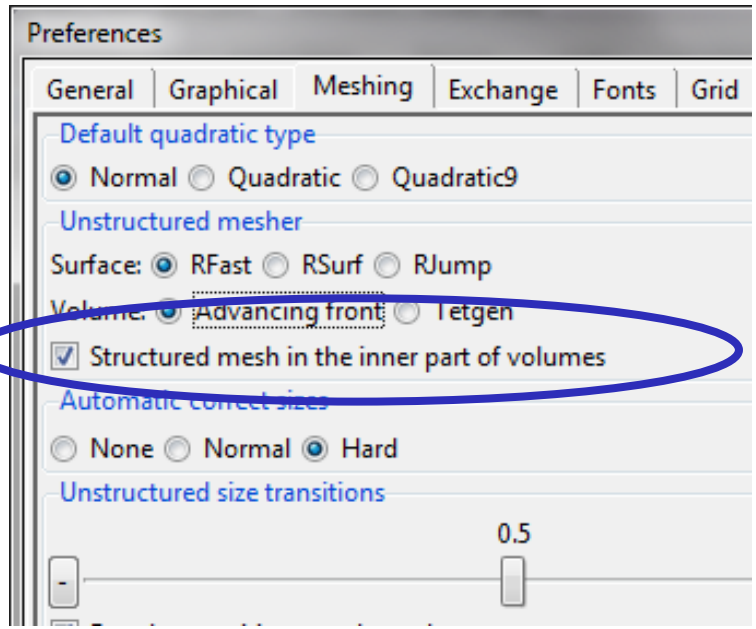
Mesher developed at WIAS Institute (Berlin) based in Delaunay.

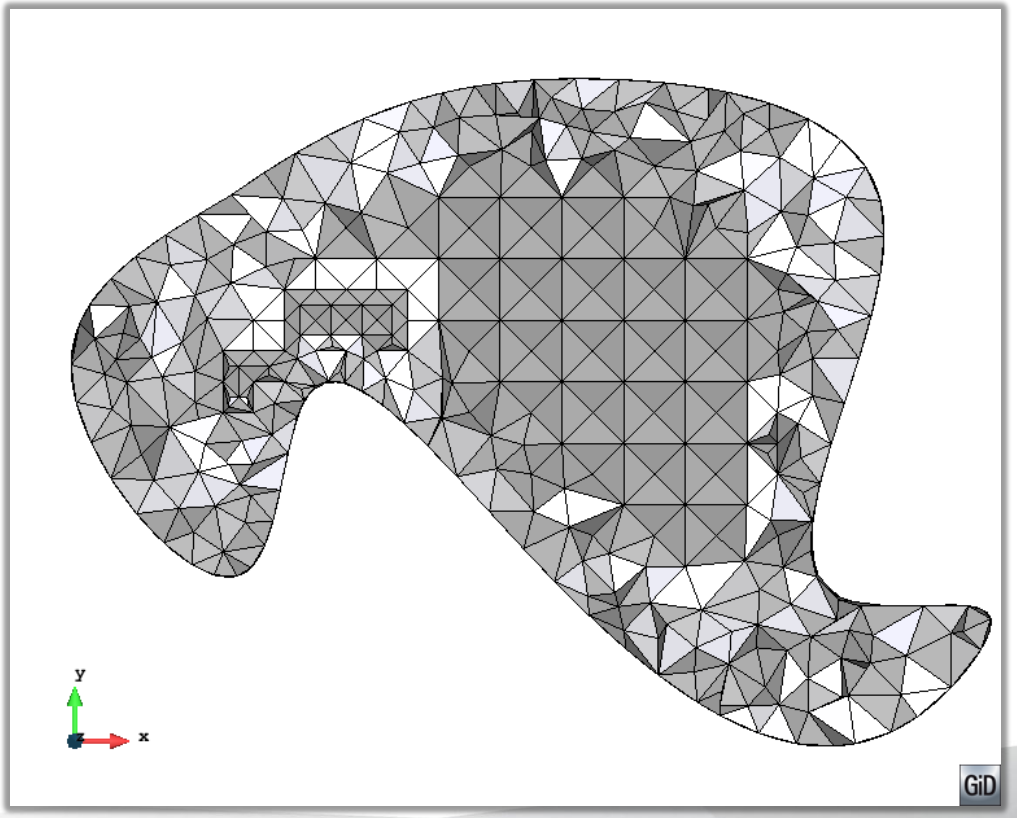




Structured mesh for inner part of volumes

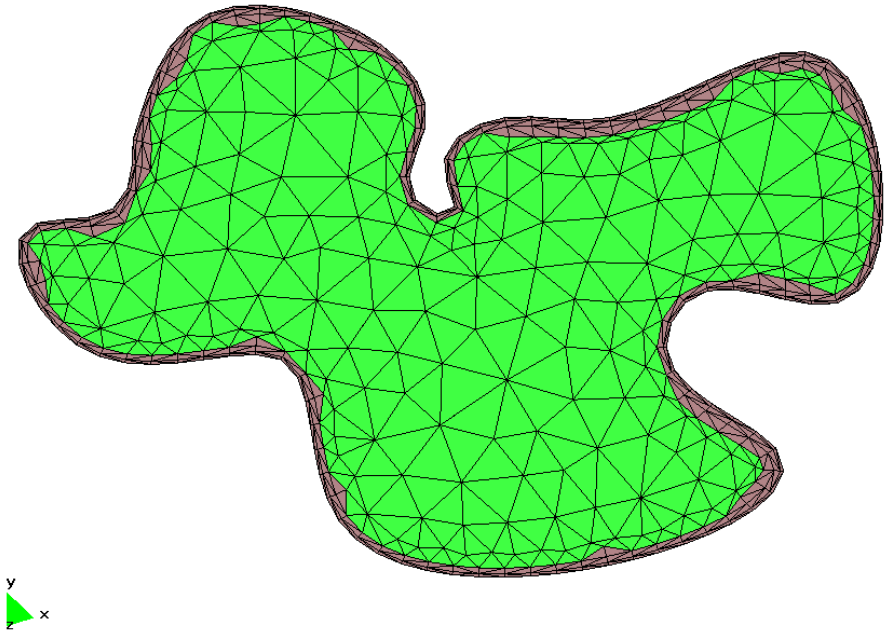
Possibility to mesh the inner part of unstructured volumes following an octree pattern



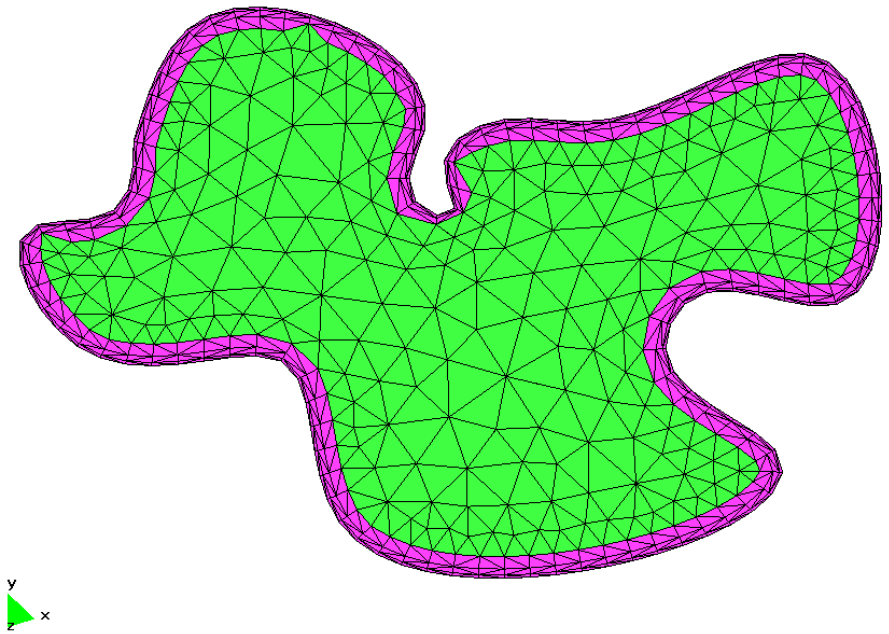


Improvements in boundary layer mesh

Try to respect more the number of layers



before

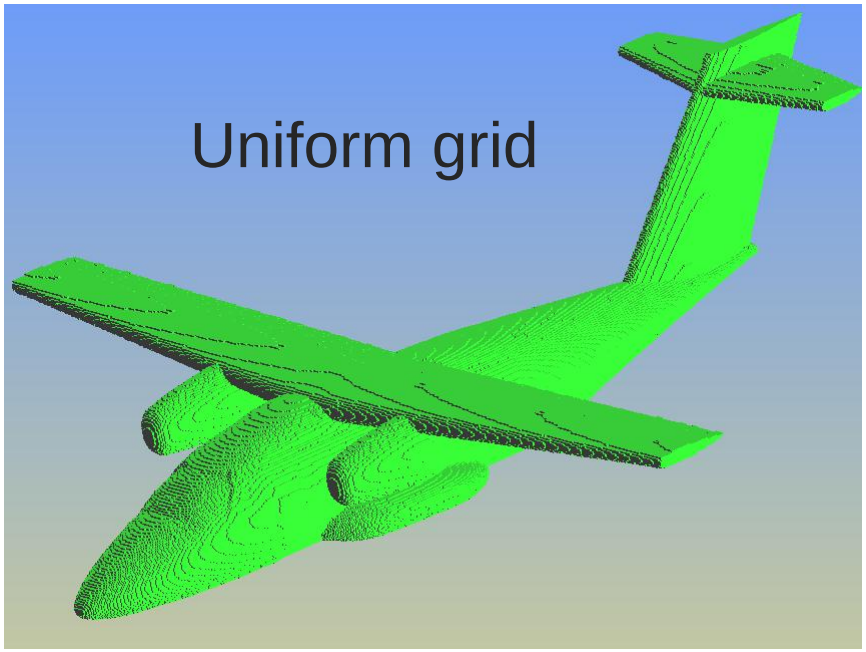


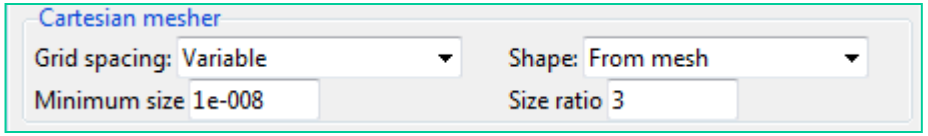
now

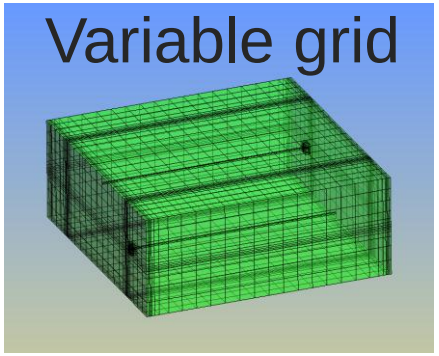
Cartesian mesh

Enhanced ‘scan-conversion’ based volume mesher

Non-uniform grid, quality of size ratios, ...





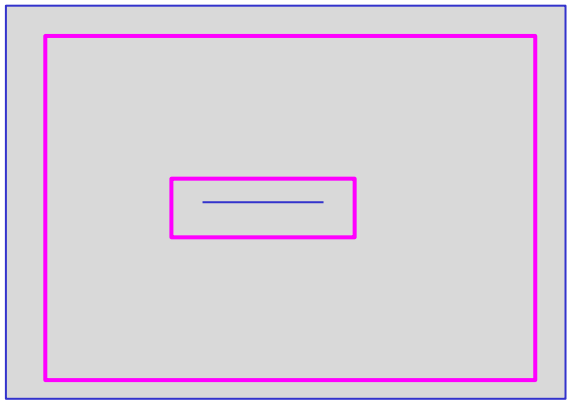


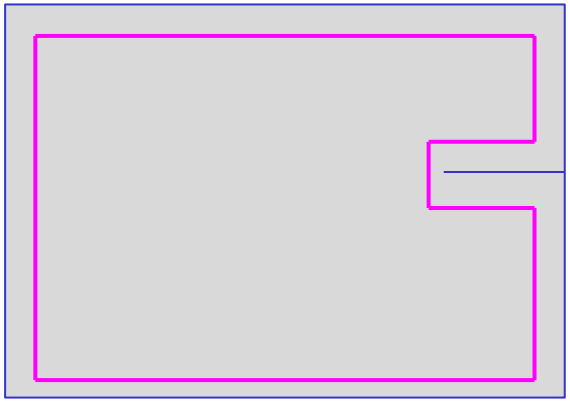
(max size ratio=2)

Basic support of edges and faces (import/export, draw, select, etc.)

Improvements in geometric intersections

- Incorporated the ‘1D holes’ in the internal definition of surfaces.

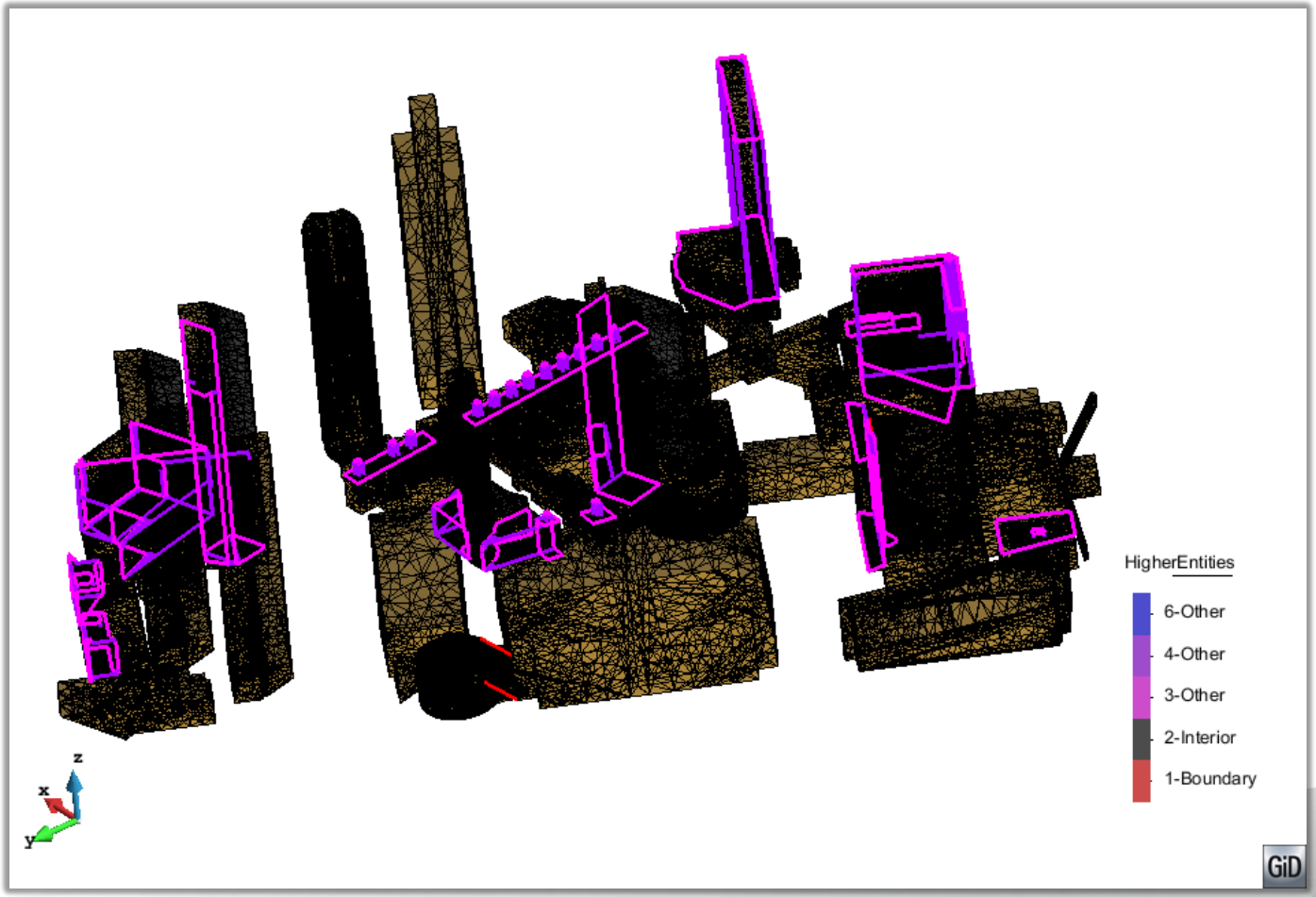




- Now the intersection operation doesn’t need ‘artificial’ splitting of surfaces
- Now the result of intersections is more independent on the steps followed
- Meshing adaptation to ‘1D holes’

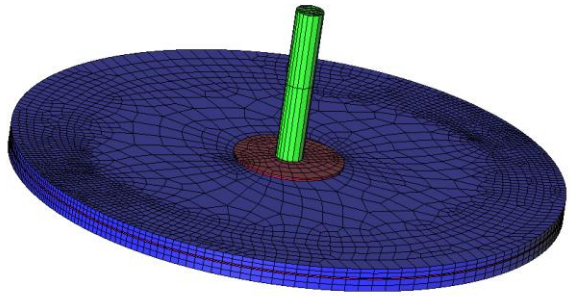
Draw higher entities on mesh edges

Useful to check mesh topology

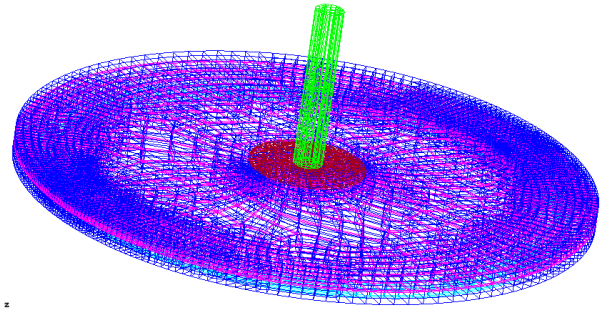


Normal render for meshes

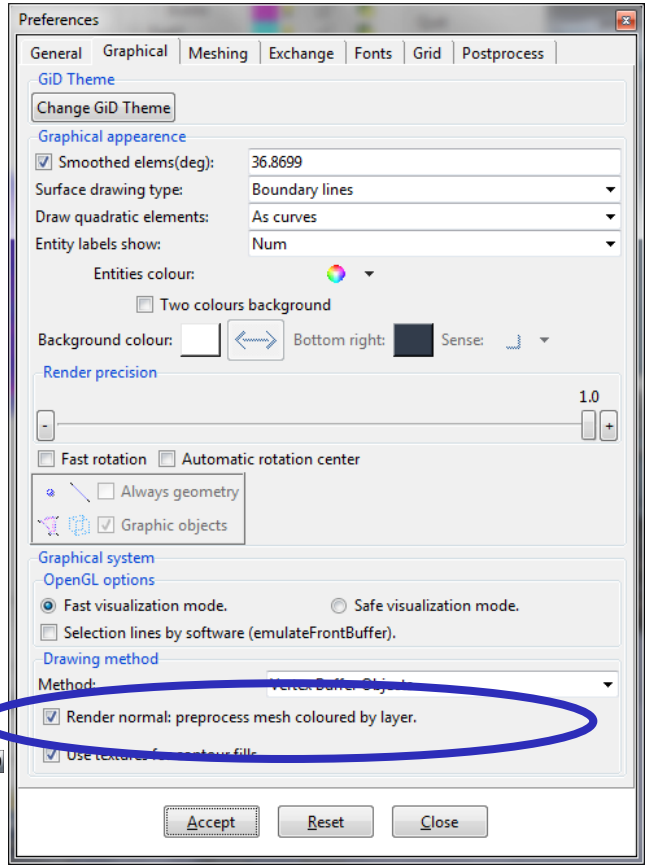
- Normal render mode: meshes can be drawn with their layer's colour



Render flat



Render normal



Other news

- Parallel processing in volumes
- Better management of ‘default’ settings when compatibilizing meshing data
  - Default number of divisions on structured entities based on unstructured general size
  - All default element type for volumes is tetrahedra
- Automatic correct sizes operations before meshing faster
- ACIS import updated until 2.0 version
- Join volumes operation
- Background image saved with the model and option to show or hide it
- Manual creation of nodes and elements

Several improvements in meshing

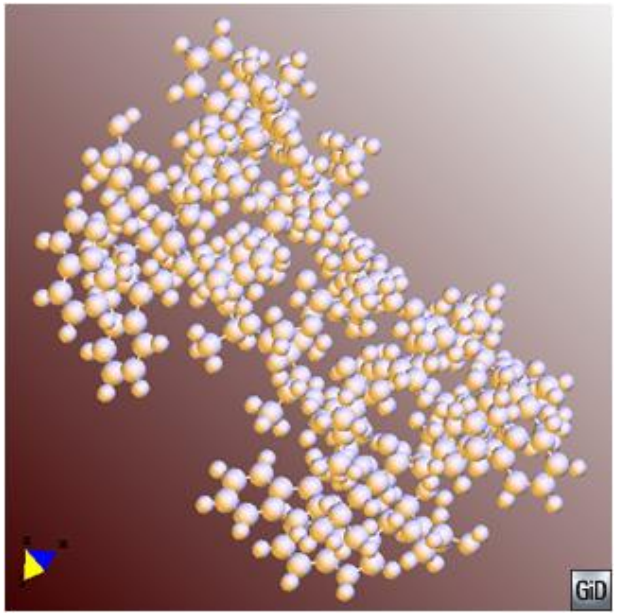
- Improvements in
  - Unstructured quadrilateral mesher
  - Advancing front surface mesher
  - Semi-structured mesher
  - Boundary layer mesher

Obj, Off & Ply import

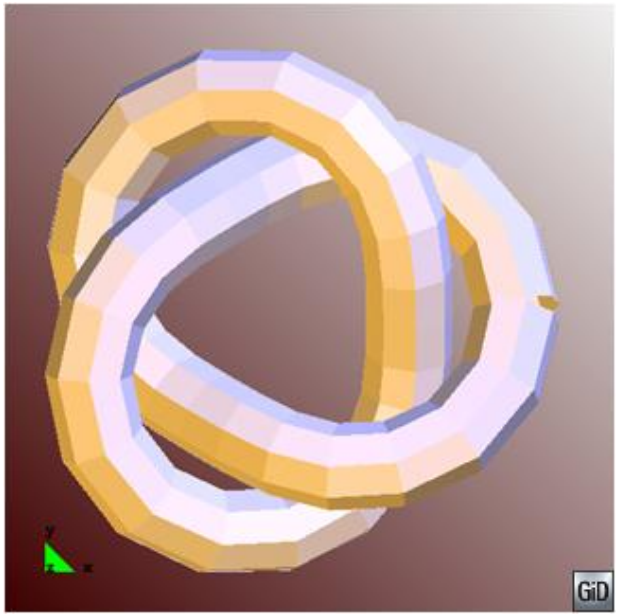
plug-ins to import in postprocess mesh and results

- OBJ: Object format, from Wavefront Technologies
- OFF: Object file format, from Geomview
- PLY: Polygon file format, from the Stanford graphics lab.

Standford's bunny ply example



Y9135_diagram obj example

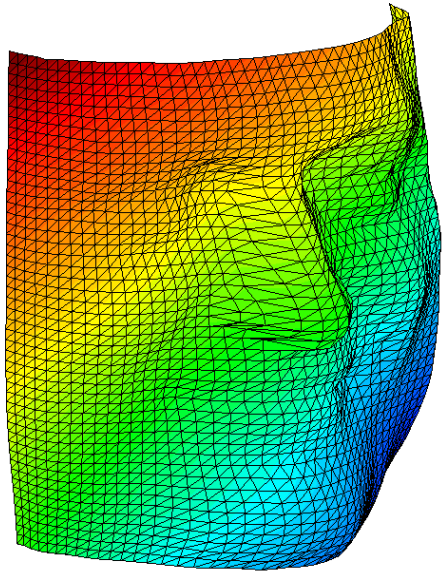


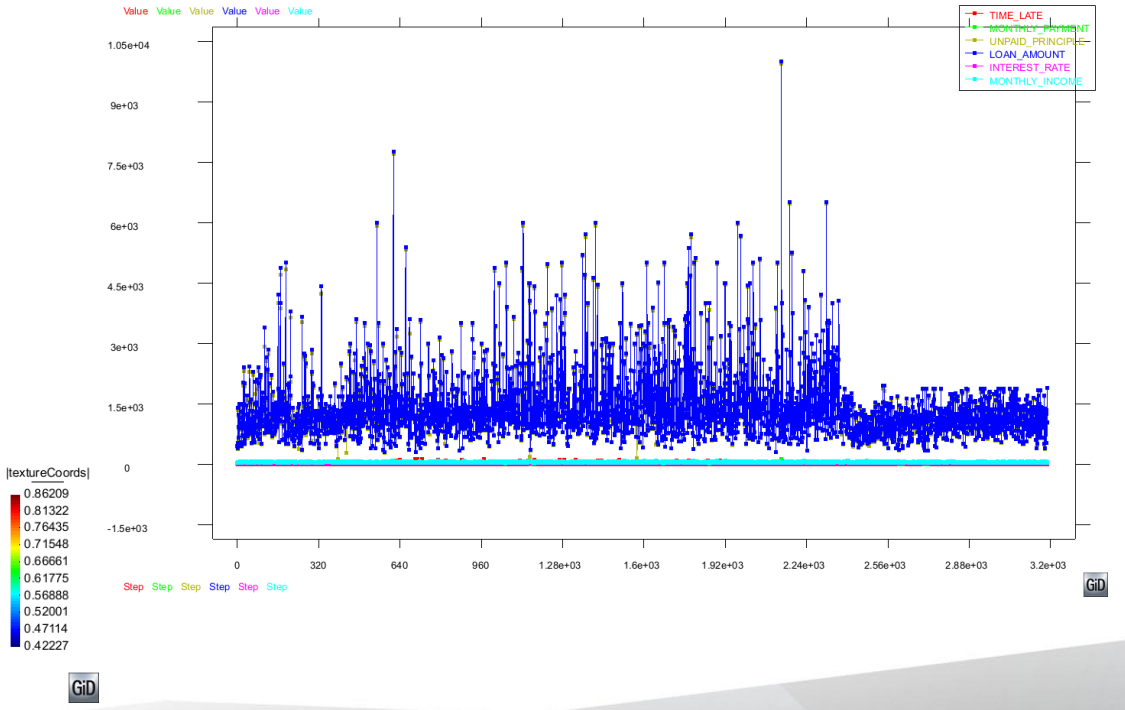
Tre off example

Vtk import

Vtk plug-in to import in postprocess vtk mesh and results

Vtk is a widely used library and format. E.g. OpenFOAM mesh and results could be converted to vtk





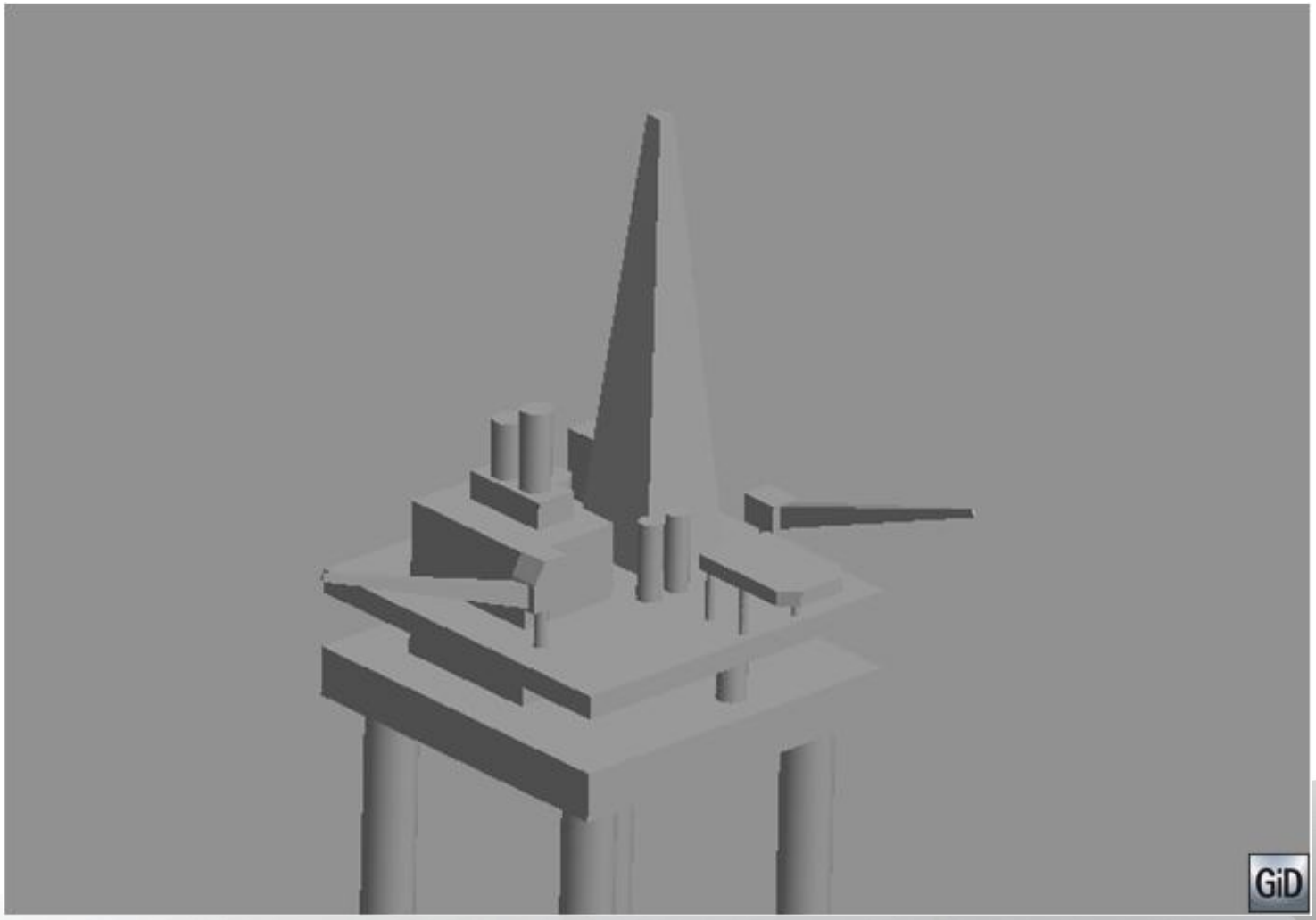
Mesh + Results: mesh operations

- Extract boundaries: creates new layer with the skin of the volume mesh, or edges of surface mesh

- Separate connected components:
  - New layer for each independent mesh
  - New layer for each set of elements limited by boundary edges
  - Uses colouring
  - Utilities → Variables → PostMaxNumComponents

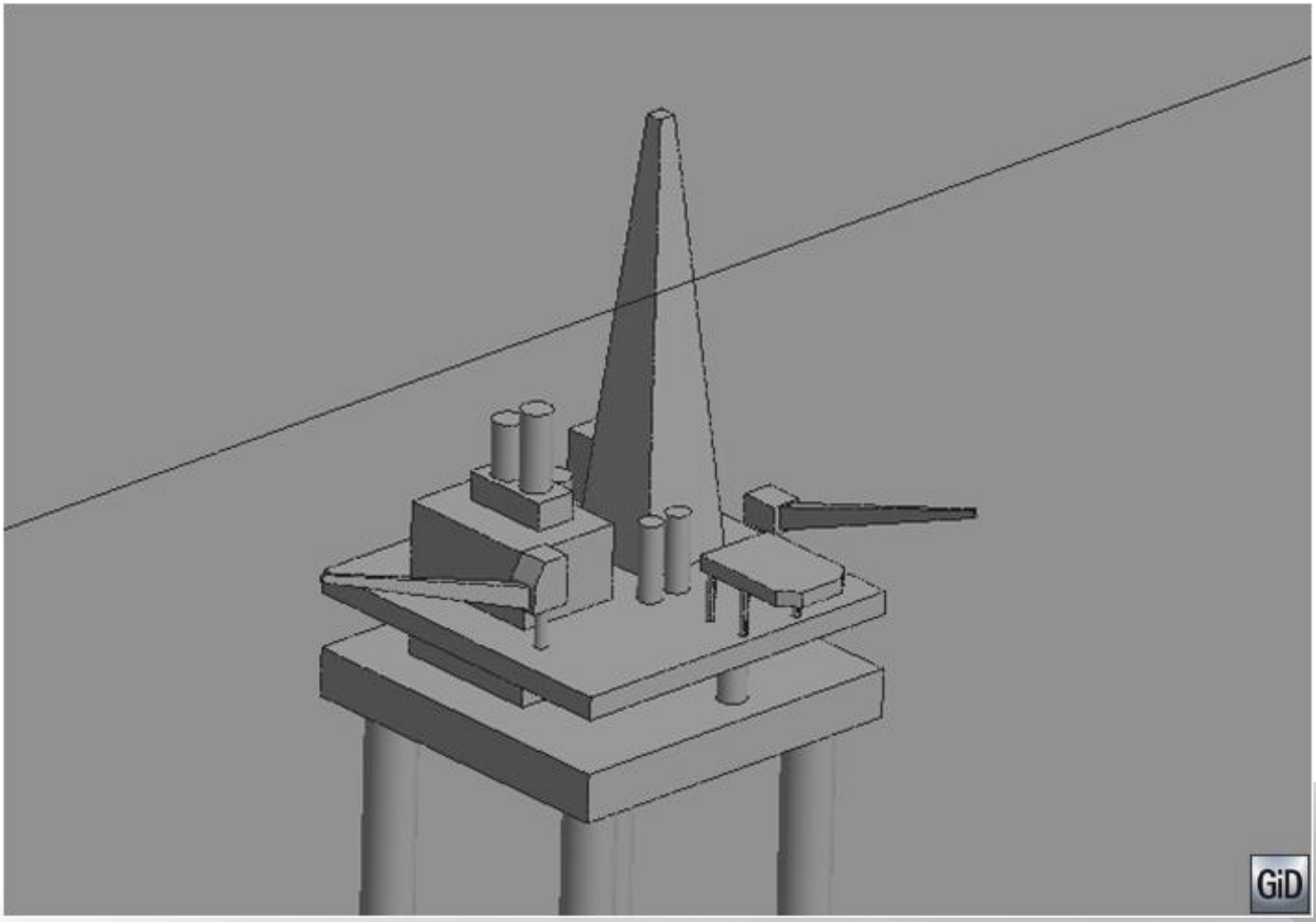
Mesh + Results: mesh operations

Platform (kratos): single volume mesh



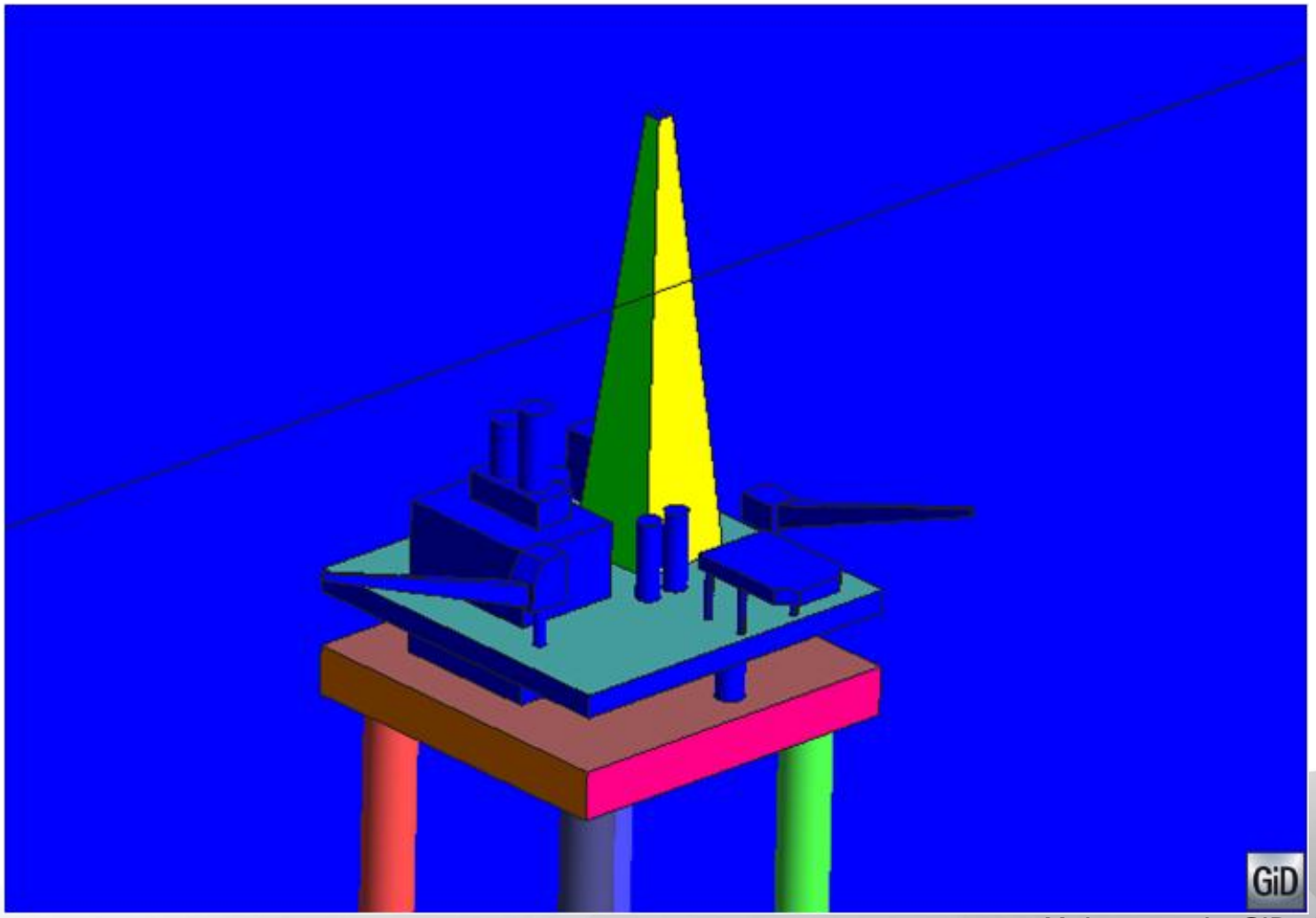
Mesh + Results: mesh operations

Options → Geometry → Extract boundaries



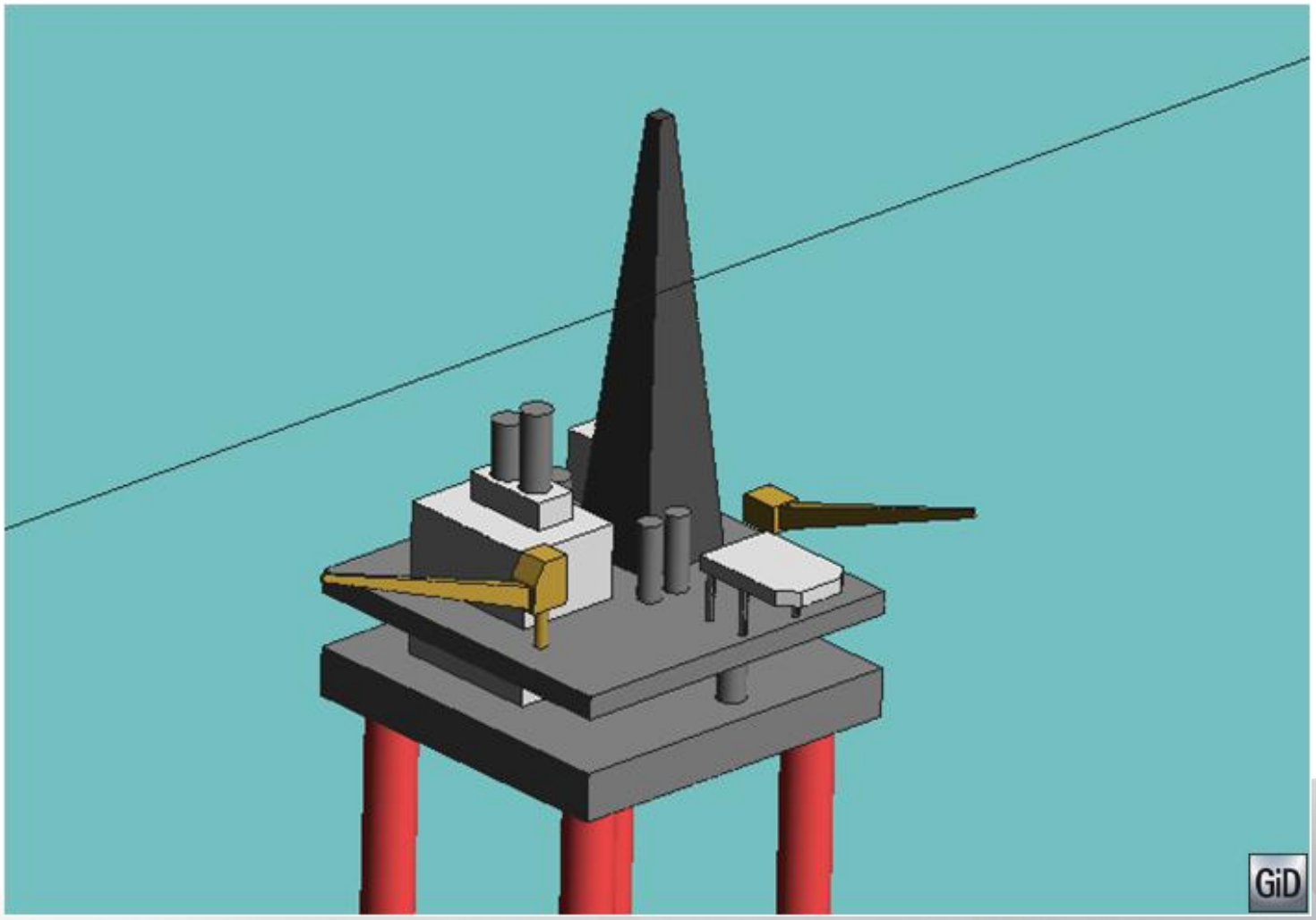
Mesh + Results: mesh operations

(...) → Separate connected components



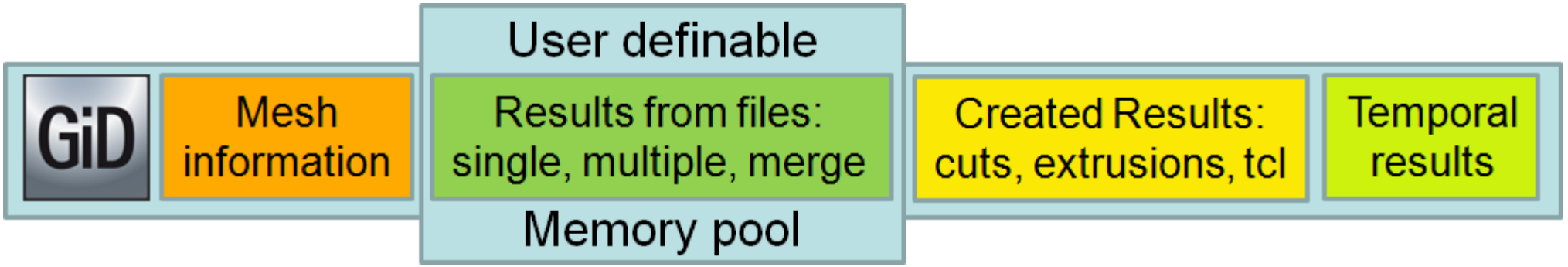
Mesh + Results: mesh operations

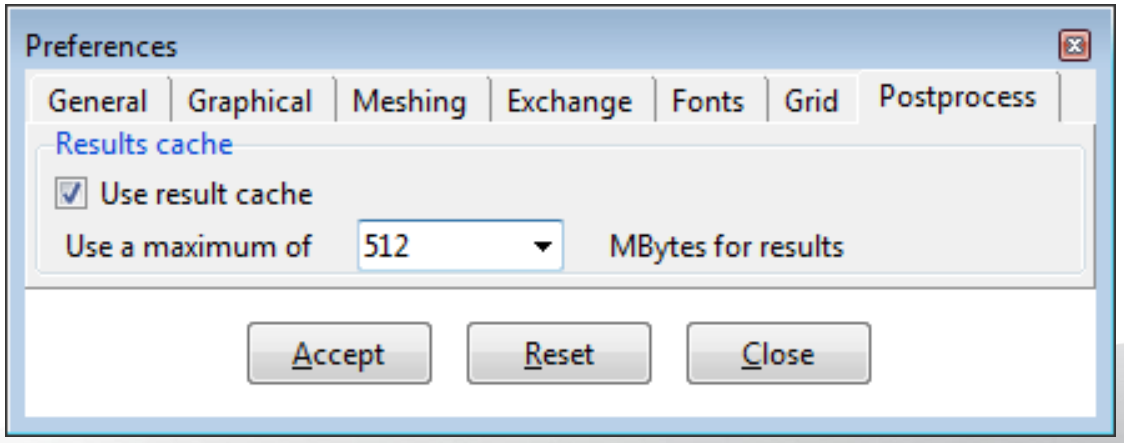
Divide by selecting elements



Large files: result's cache

- Uses a user defined memory pool to store results
- Used to cache results stored in files



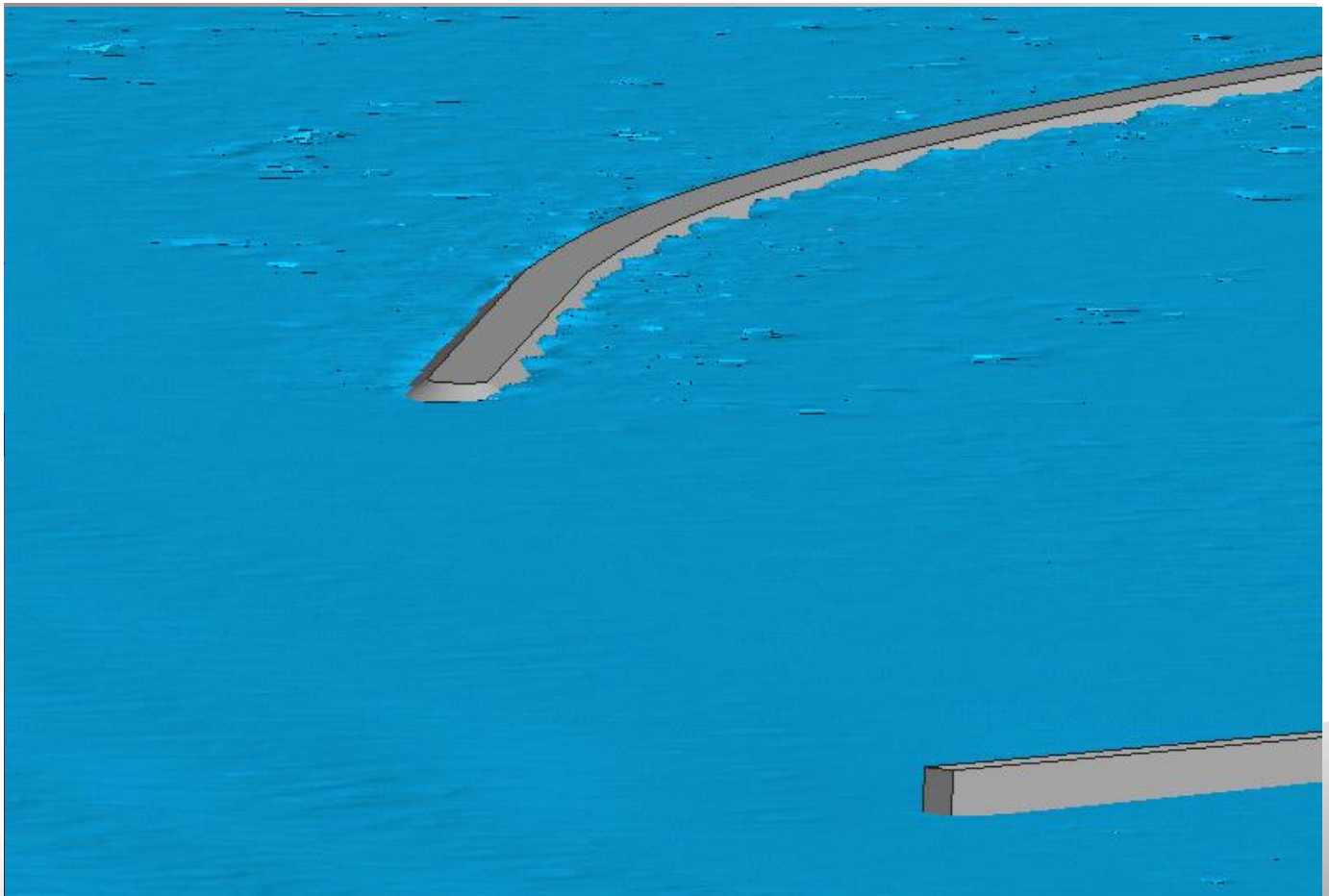


Large files: result's cache

- How it works:
  - Verifies result's file(s) and gets result's position in file and memory footprint
  - Loaded on demand
  - Touch on use
  - Oldest results unloaded if needed
  - Results of latest analysis step in memory
- What's not cached:
  - Results for cuts, extrusions, iso-surfaces when they are converted to full featured meshes
  - Created results
- Caution: results files remain open!

Large files: result's cache

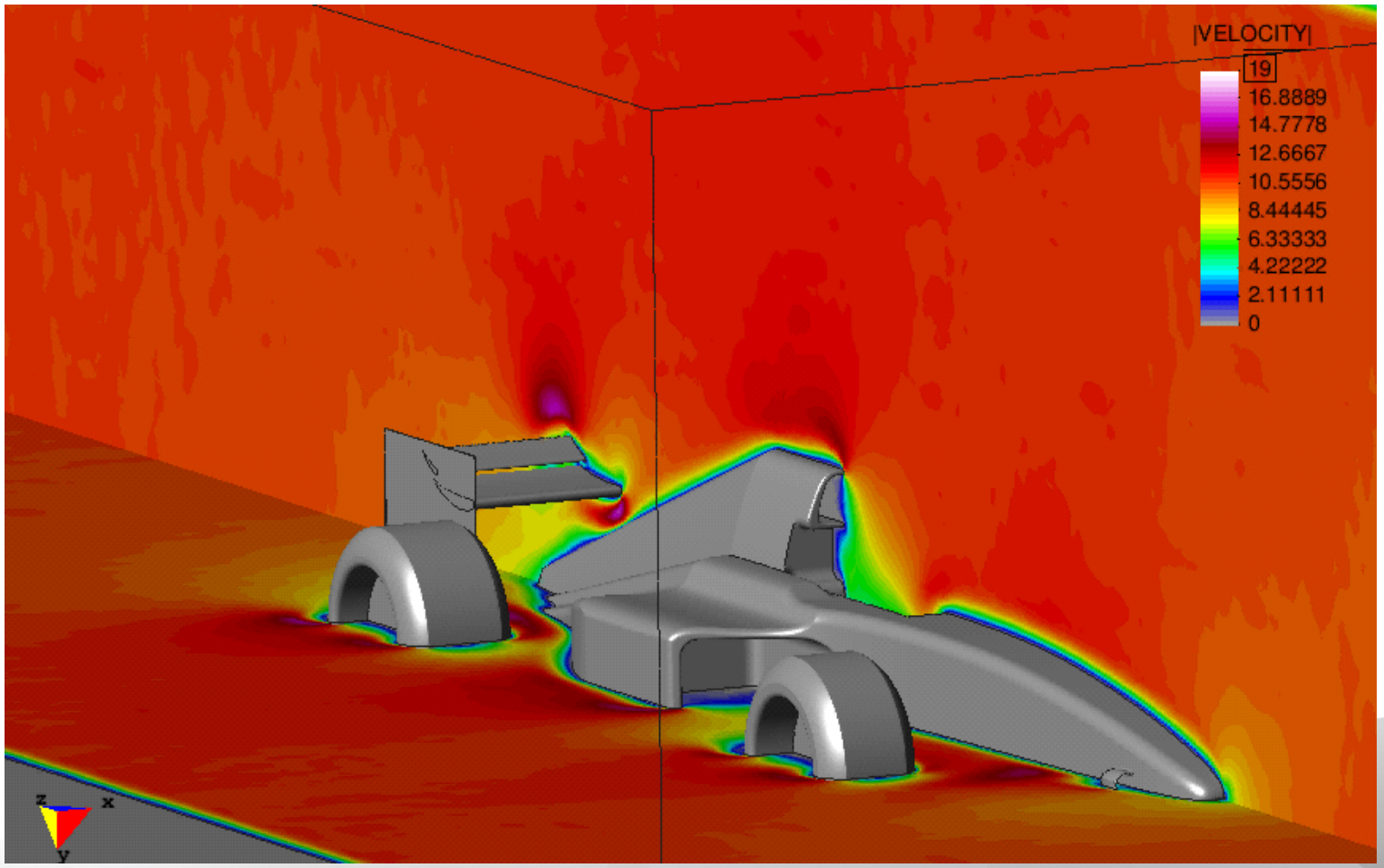
- Successful stories:
  - Chinese harbour result file size ~104 GBytes
  - With 2GB result's cache: 3.16 GB memory usage



1.307.389 nodes
6.852.005 tetrahedrons
2.292 time-steps

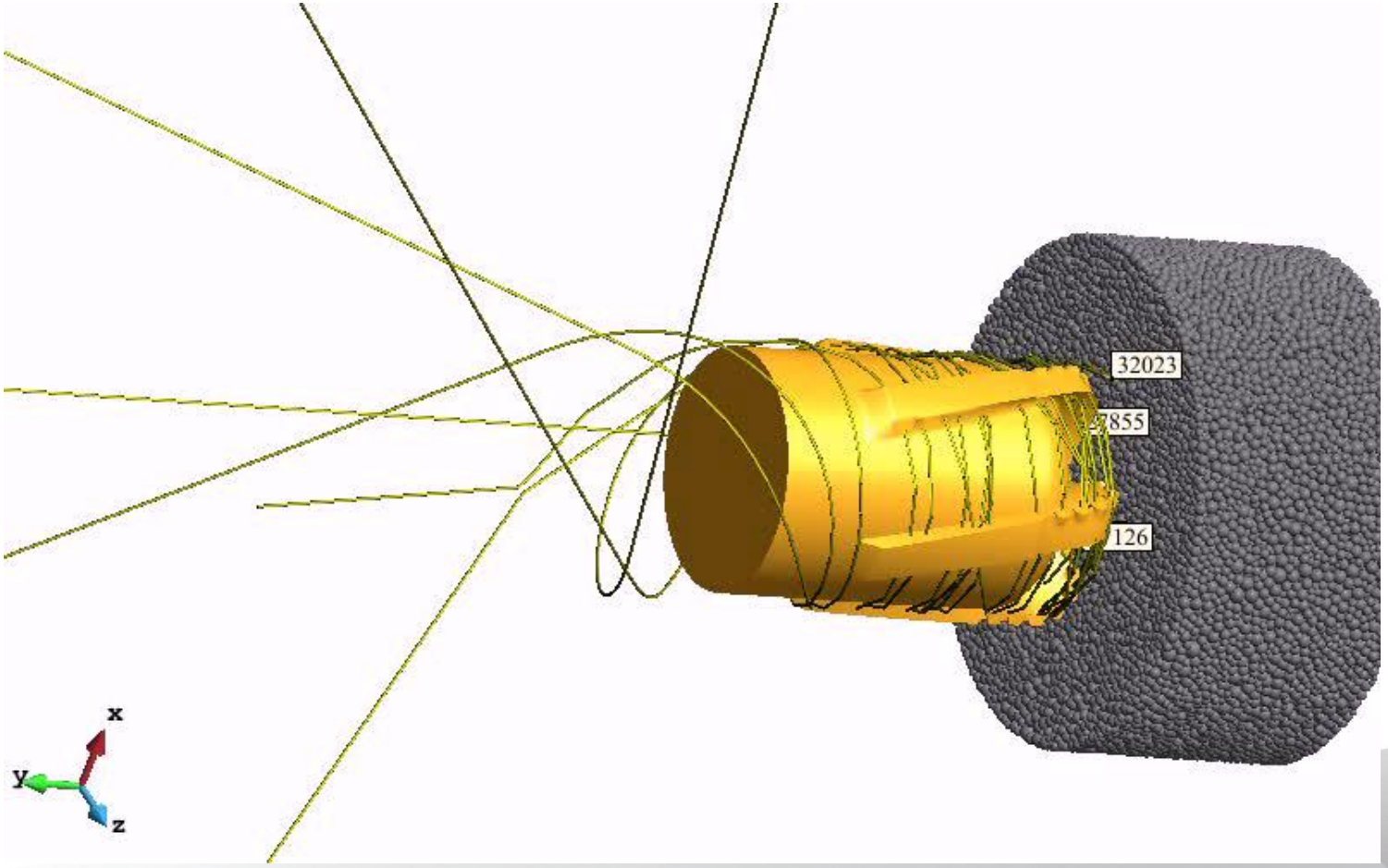
Large files: result's cache

- Successful stories:
  - Racing car model: 103.671.344 tetrahedrons



Node tracing

Allows the user to track nodes, and their traces are displayed



Complex results

- Complex support:
  - Complex scalar: real and imaginary part
  - Complex vector:
    - real and imaginary part for x, y and z.
    - Mod(Real), Mod(Imag) and Mod(vector) can be provided or calculated by GiD.
  - Real and imaginary parts selectables for:
    - display vectors,
    - line diagrams,
    - stream lines,
  - Complex point evolution: x = real, y = imaginary

Complex results

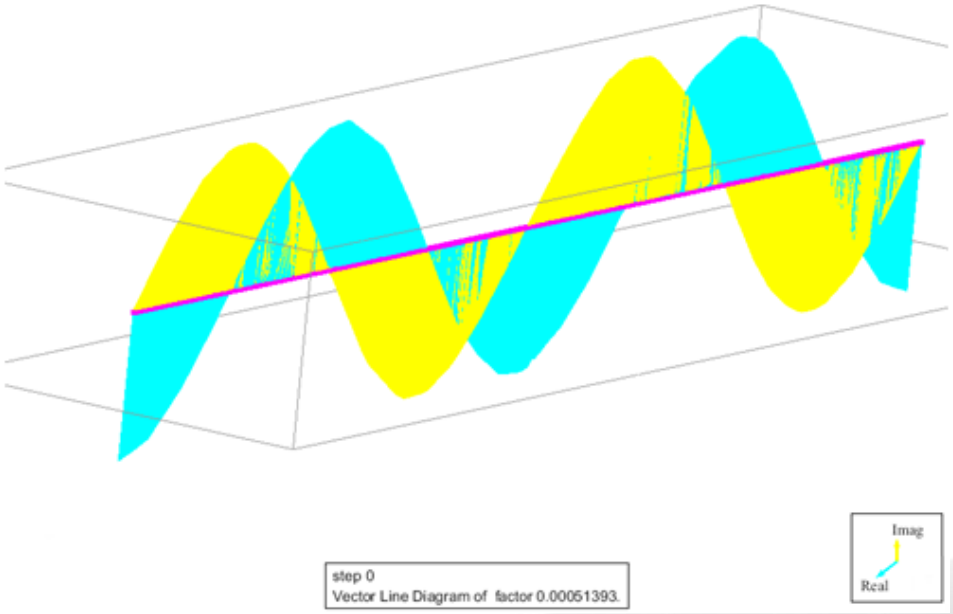
Result "Complex//E" "ERMES" 0 ComplexVector OnNodes

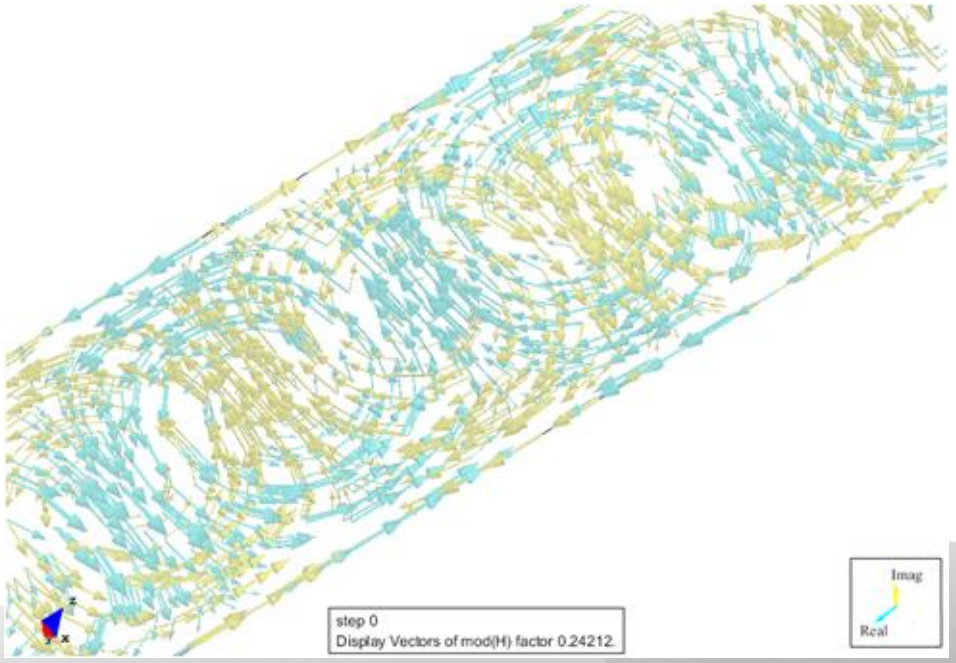
ComponentNames "X-rE", "X-iE", "Y-rE", "Y-iE", "Z-rE", "Z-iE", "|rE|", "|iE|", "mod(E)"

Values

1 4.01e-02 -9.79e-03 -4.01e-02 9.79e-03 0.00e+00 0.00e+00 5.67e-02 1.38e-02 5.83e-02

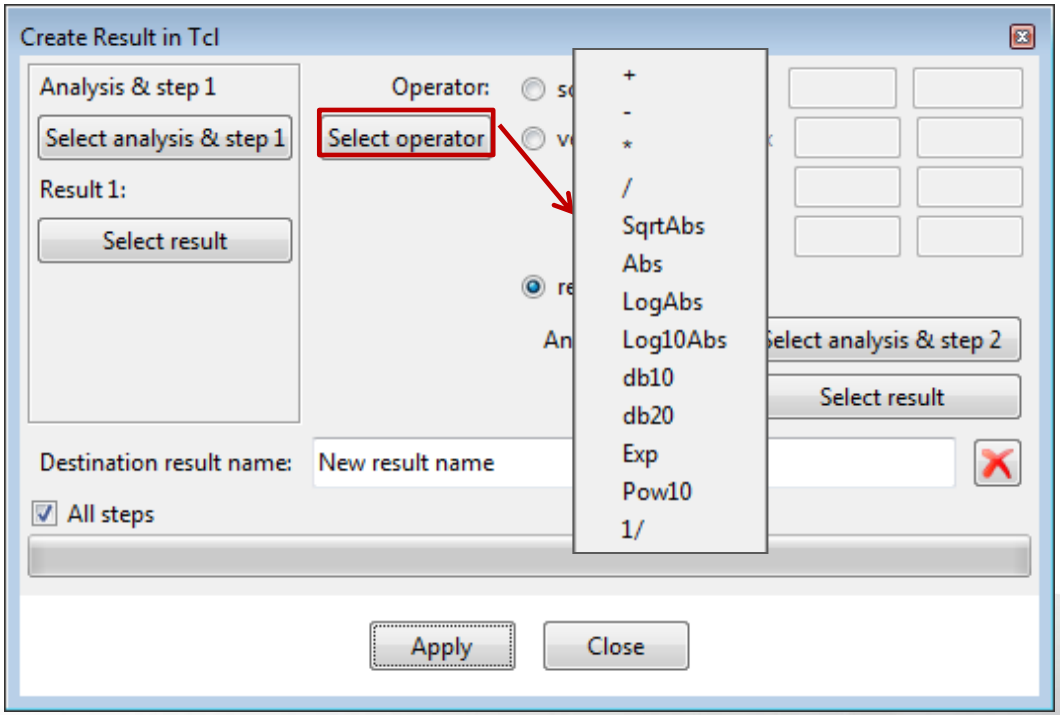
2 8.55e-01 1.63e-01 -8.54e-01 -1.63e-01 0.00e+00 0.00e+00 1.21e+00 2.31e-01 1.23e+00

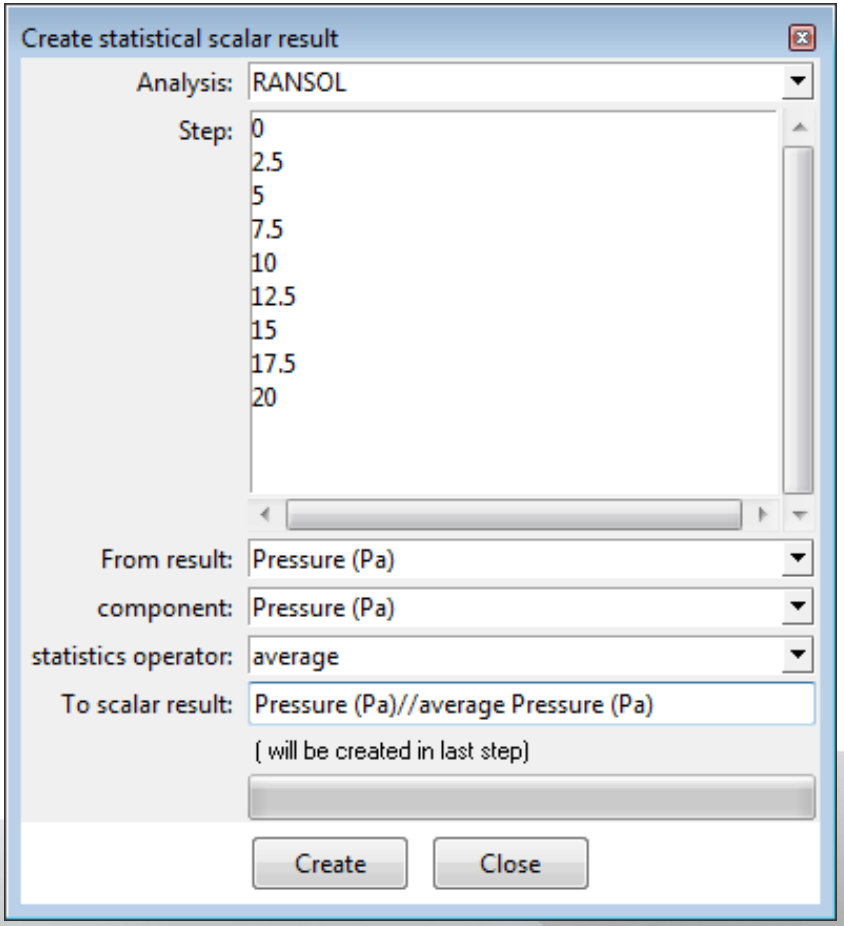




Create results

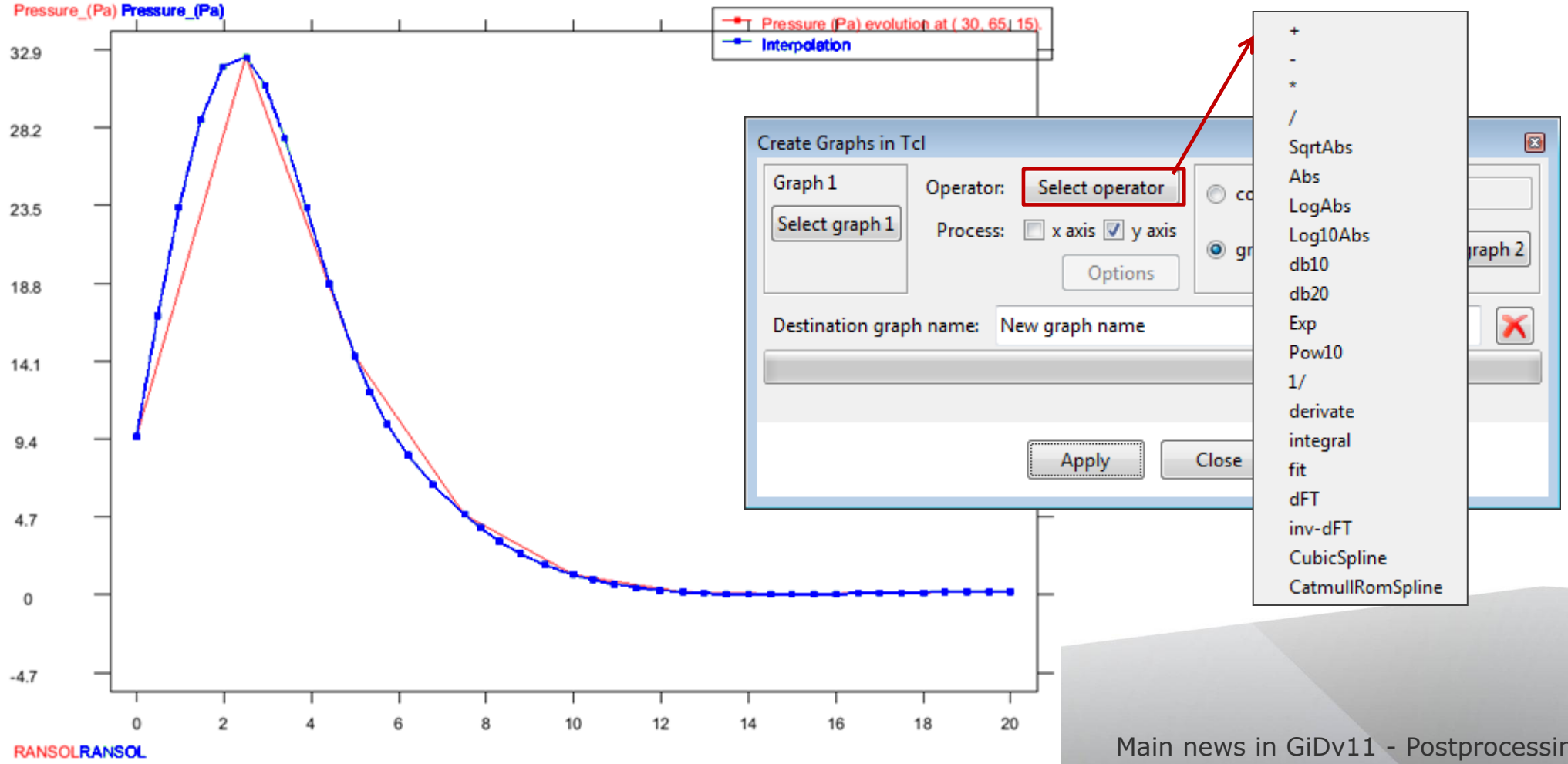
- Window to create results for all steps in analysis
- Statistical scalar results:
  - minimum, maximum,
  - average,
  - the standard deviation





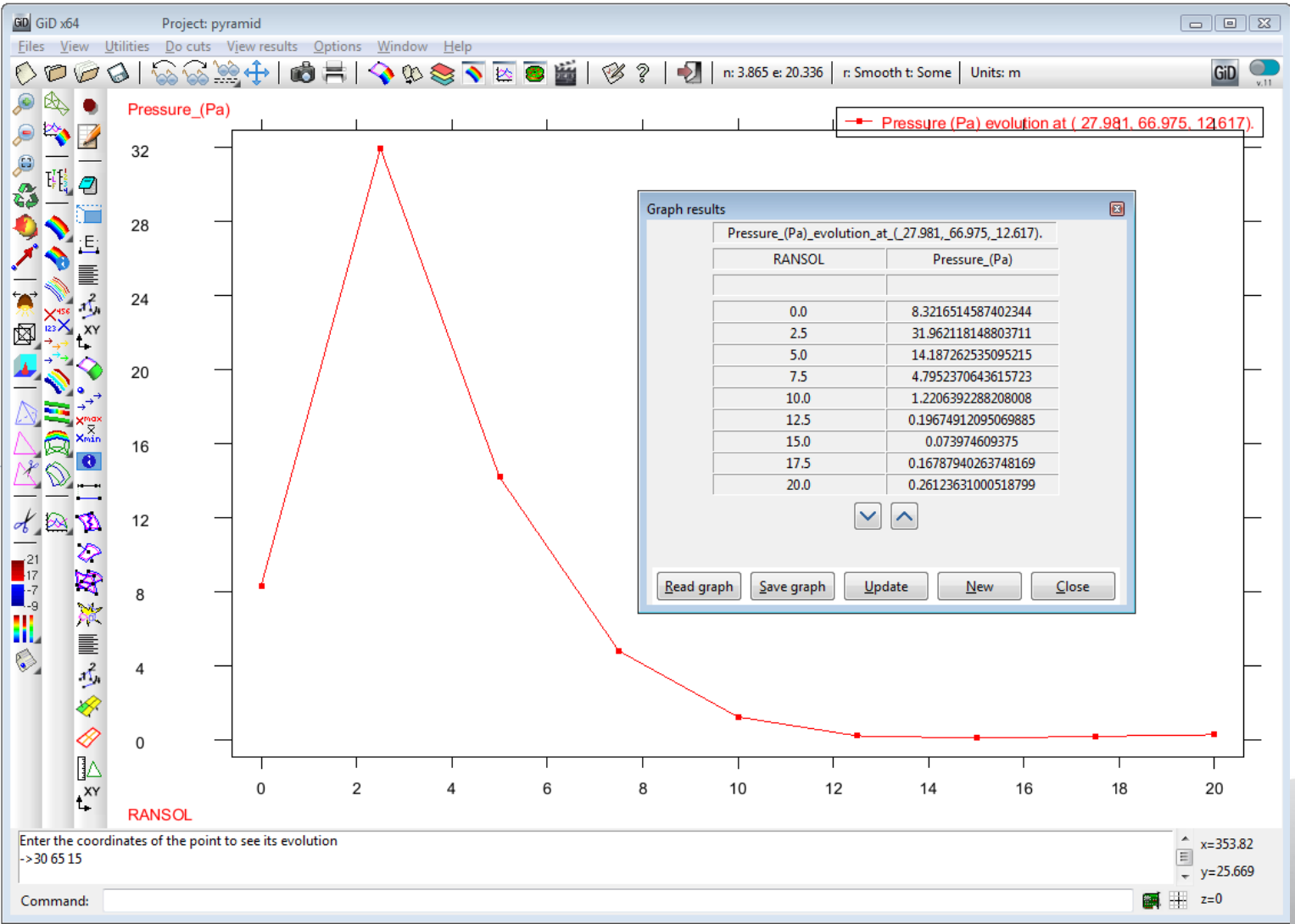
Create graphs

- New graphs combining existent ones: +, -, *, …
- Interpolation of graphs, discrete Fourier transforms, …



Graph results table

- Shows graph results in a separate table



Values can be edited

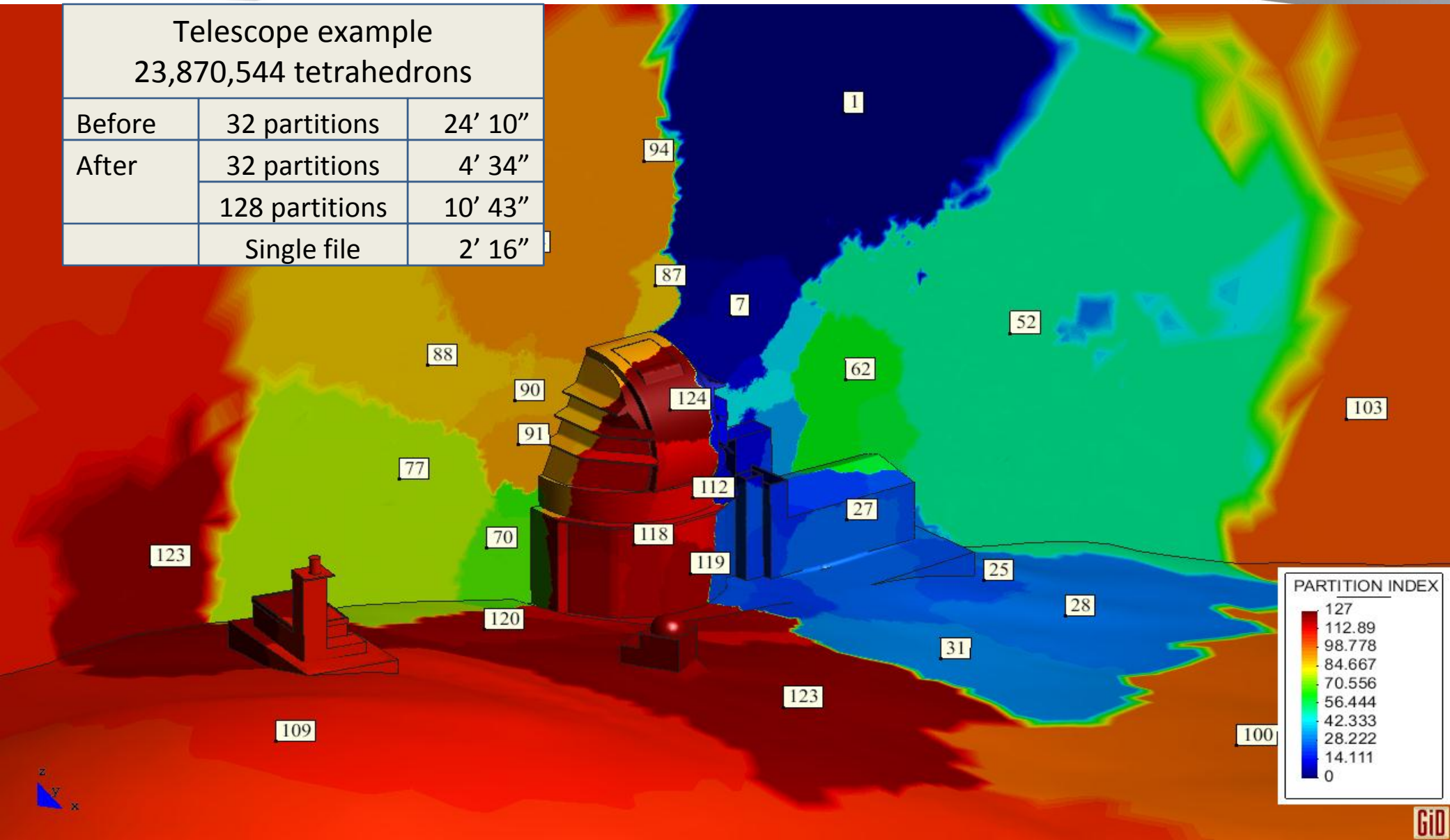
Graph can be read and saved

Merge improved

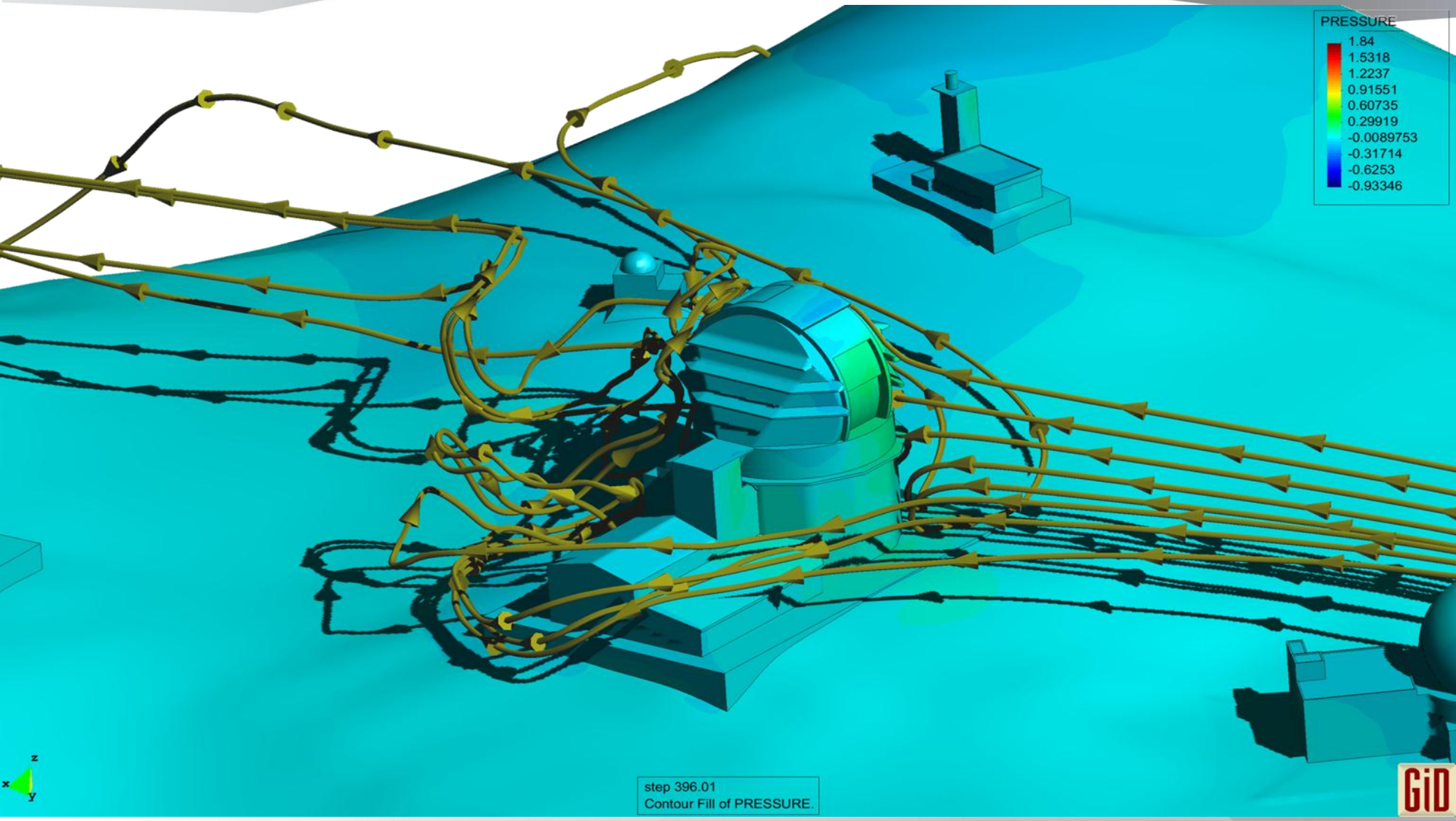
- Merge improved, by postponing any calculation:
  - Skin extraction
  - Finding boundary edges
  - Smoothed normals
  - Neighbour information
  - Graphical objects creation

Merging many partitions

Telescope example 23,870,544 tetrahedrons		
Before	32 partitions	24’ 10”
After	32 partitions	4’ 34”
	128 partitions	10’ 43”
	Single file	2’ 16”

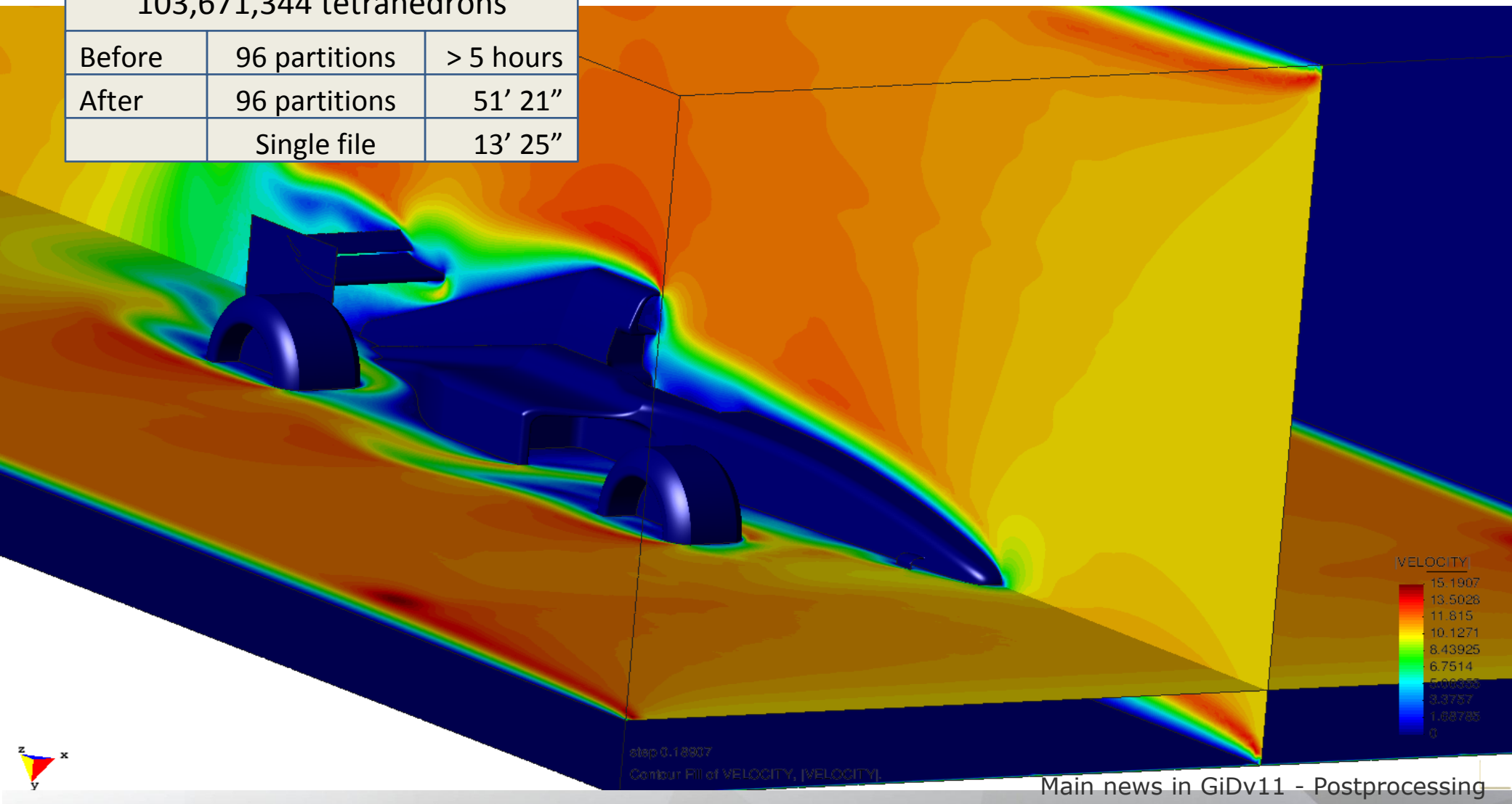


Merging many partitions



Merging many partitions

Racing car example 103,671,344 tetrahedrons		
Before	96 partitions	> 5 hours
After	96 partitions	51’ 21”
	Single file	13’ 25”



Other news in postprocess

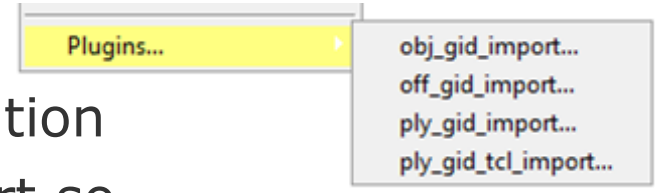
- Postprocess session state (isosurfaces, stream lines, etc)
- Contour Fill/Ranges: shows the range under the cursor
- More options available in numerical integration of results
- Improvements in several algorithms: stream lines, etc.
- Read ‘GiD postprocess HDF5’ results
- STL and PLY export of current viewed meshes and results
- Stream lines can be exported and imported
- Result surface on lines, draws them with thickness

GiD dynamic library plug-ins

Mechanism to handle dynamic libraries.

Developed interface to create post mesh and nodal results.

- Loaded on demand.
- Registers GiD functions and gets information
- $GID/plugins/Import/MyImport/MyImport.so



- What's inside $GID/plugins/Import folder:
  - Documentation, examples with sources, Makefiles for Linux and Mac OS X, MS Visual projects
  - OBJ: Wavefront Object format from Wavefront Technologies
  - OFF: Object file format vector graphics file from Geomview
  - PLY: Polygon file format, aka Stanford Triangle Format, from the Stanford graphics lab.
  - PLY-tcl: the same as PLY but showing a Tcl progress bar

GiD-Tcl commands

GiD_Geometry now allow also create and ask for **contactsurface** and **contactvolume** and to list problematic unrendered surfaces.

GiD_Cartesian to get and set cartesian grid properties.

GiD_BackgroundImage to handle background image.

GiD_MeshPost to create and inquire postprocess mesh.

GiD_Result, new '**gauss_point**' and '**result_ranges_table**' sub-commmands

GiD_Graph to handle postprocess graphs.

GiD-Tcl events

AfterCreateMaterial, **AfterRenameMaterial**, **BeforeDeleteMaterial**, **AfterChangeMaterial**, **AfterAssignMaterial**

BeforeMeshErrors

BeforeResultReadErrors.

GiD_Info *events* : to know the full list of raised events

Tcl binary packages

- HDF5 Tcl wrapper (I/O library and format to handle scientific large and complex data collections)
- GDAL Tcl wrapper (library for reading and writing raster geospatial data formats: Arc/Info, tiff, png, …).
- Vtk tcl wraper (librarya for scientific visualization)

  And vtk_objarray optional package to efficiently transfer array data between vkt structures and Tcl

The HDF Group

GDAL

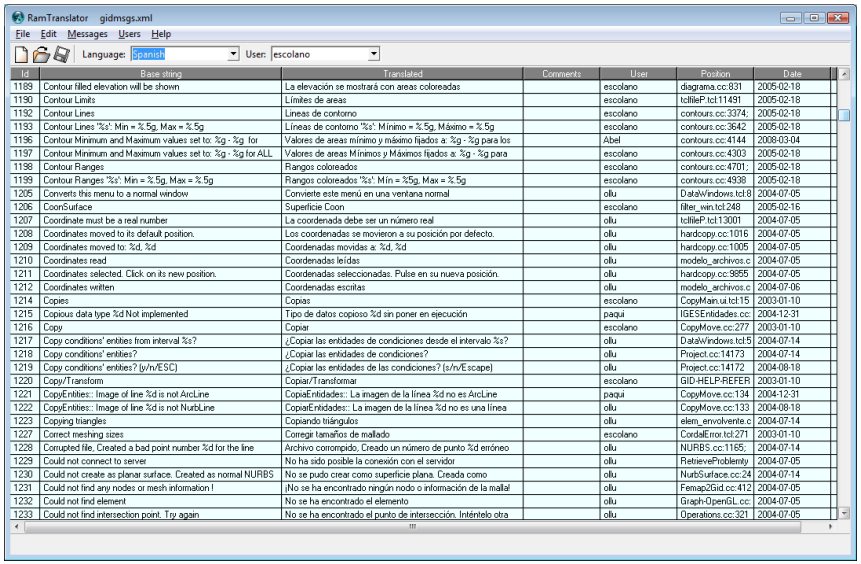
Visualization Toolkit

The packages are used by several import/export plug-ins

Other binary packages

More binary packages are included by default in GiD:

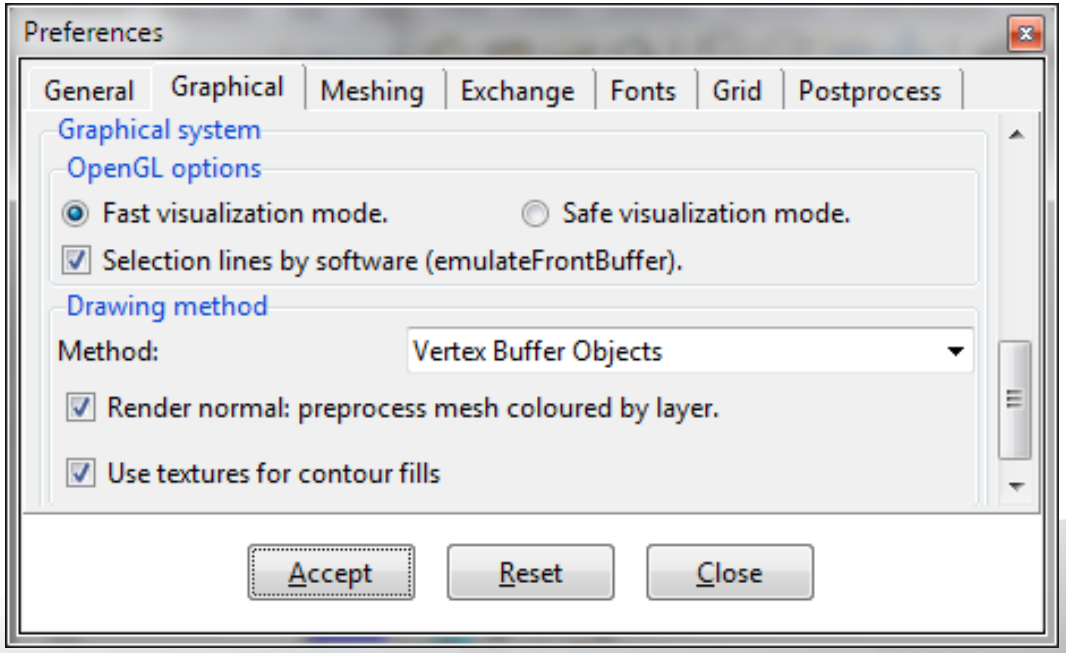
- **Verifp**: to check problemtypes protection
- **TkTable**: to visualize and edit table-like data
- **Tcl/Tk** updated to version 8.5.11



Tktable widget used in Ramtranslator

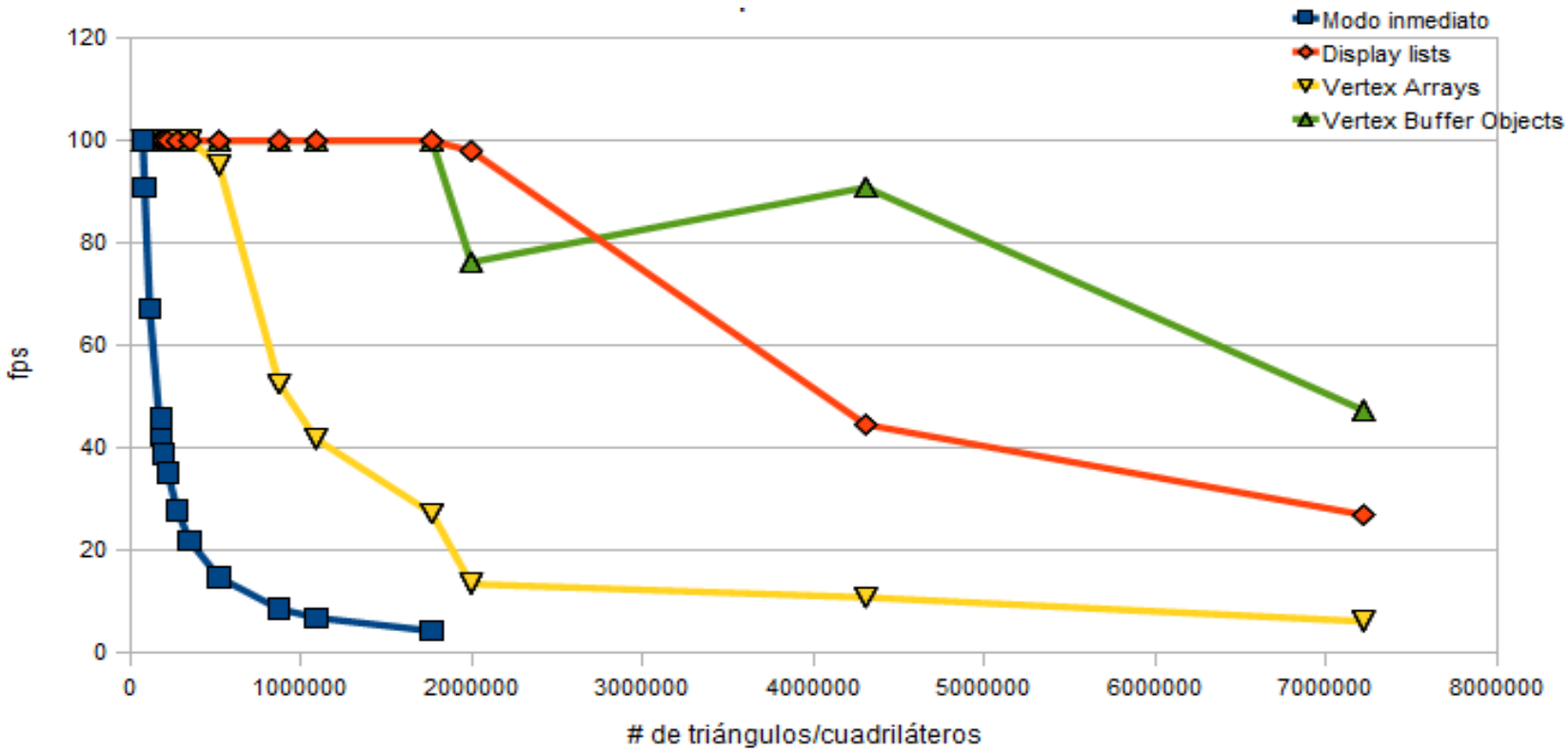
Faster visualization

- OpenGL techniques:
  - Display lists: compiled list of commands, stored in graphics memory
  - Vertex arrays: compact data, fewer calls
  - Buffer objects: arrays stored in graphics memory
  - Textures for contour fills, etc.



Faster visualization

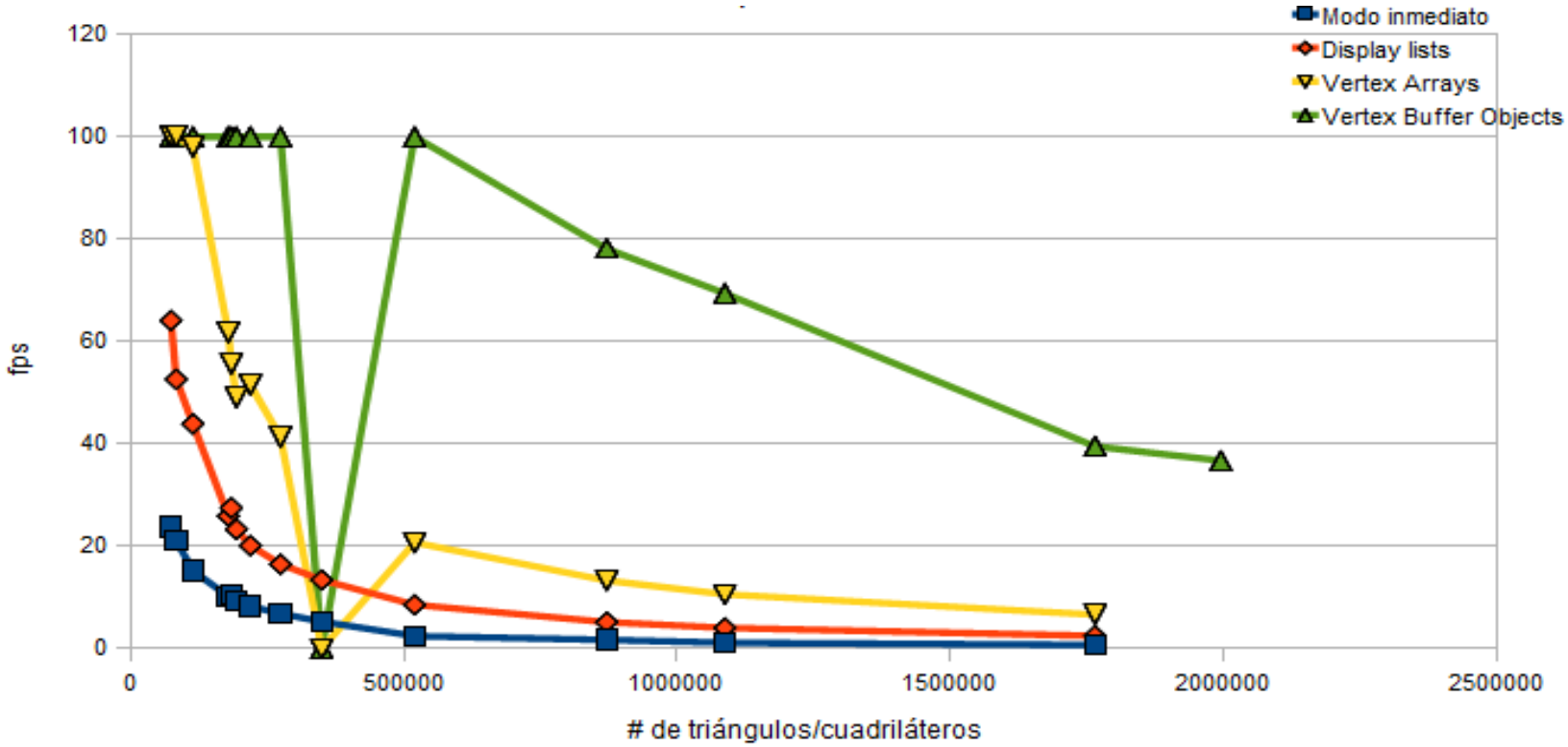
- Useful with graphics hardware



Intel QuadCore Q9550 + NVIDIA GTX 275 (896MB)

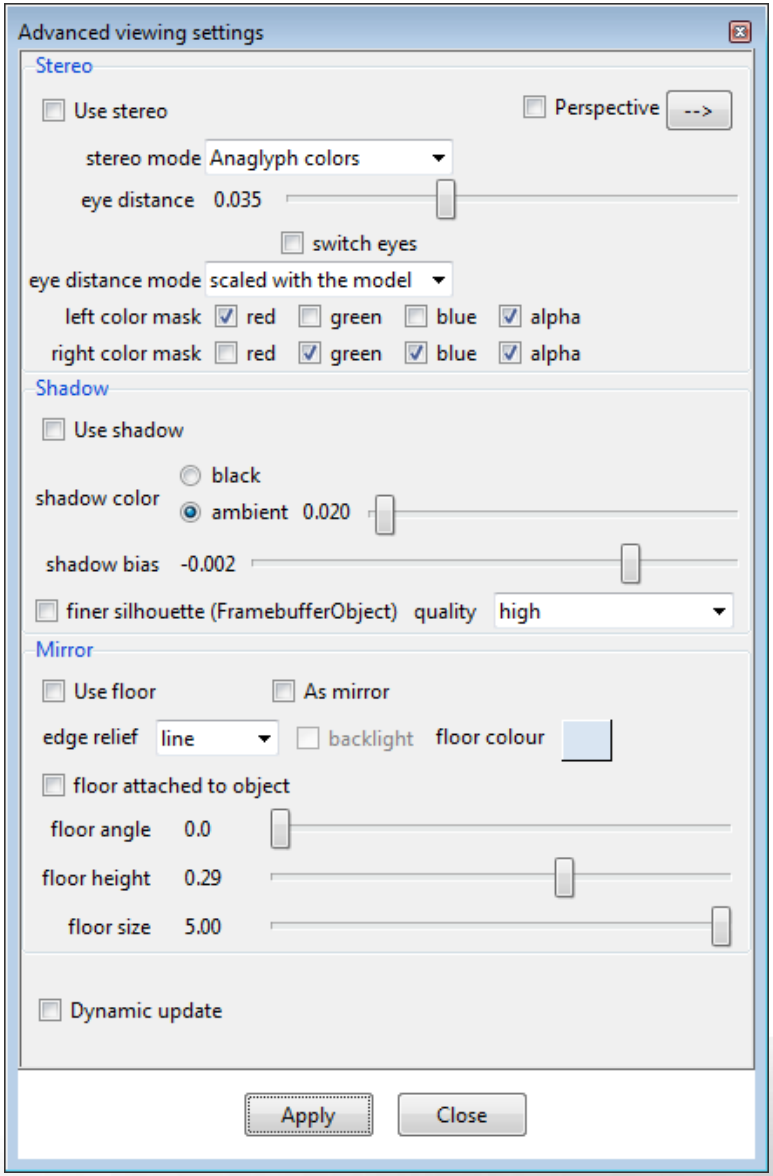
Faster visualization

- Useful with modest graphics hardware



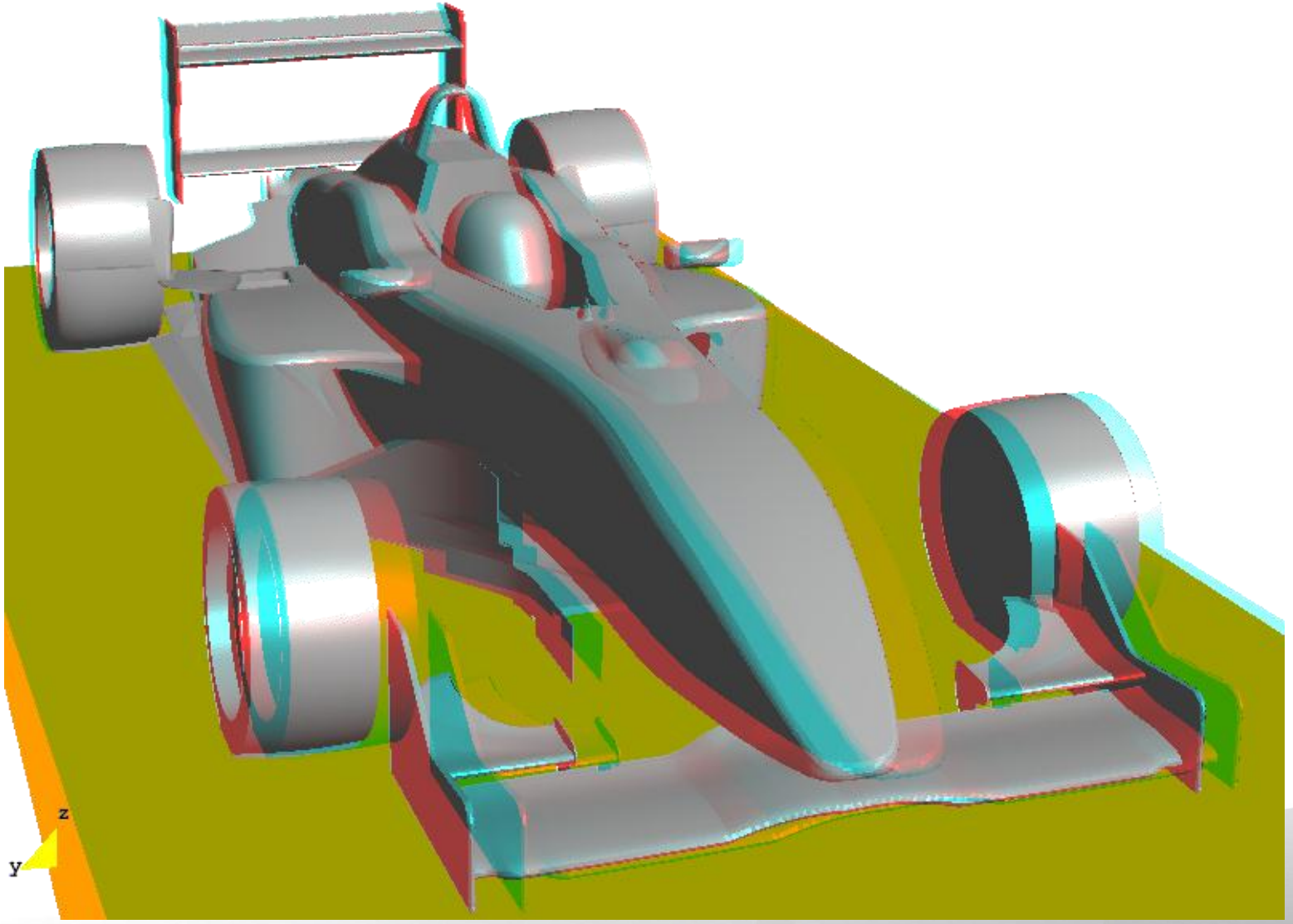
Intel QuadCore Q9550 + Intel G45 (shared memory)

Advanced viewing settings



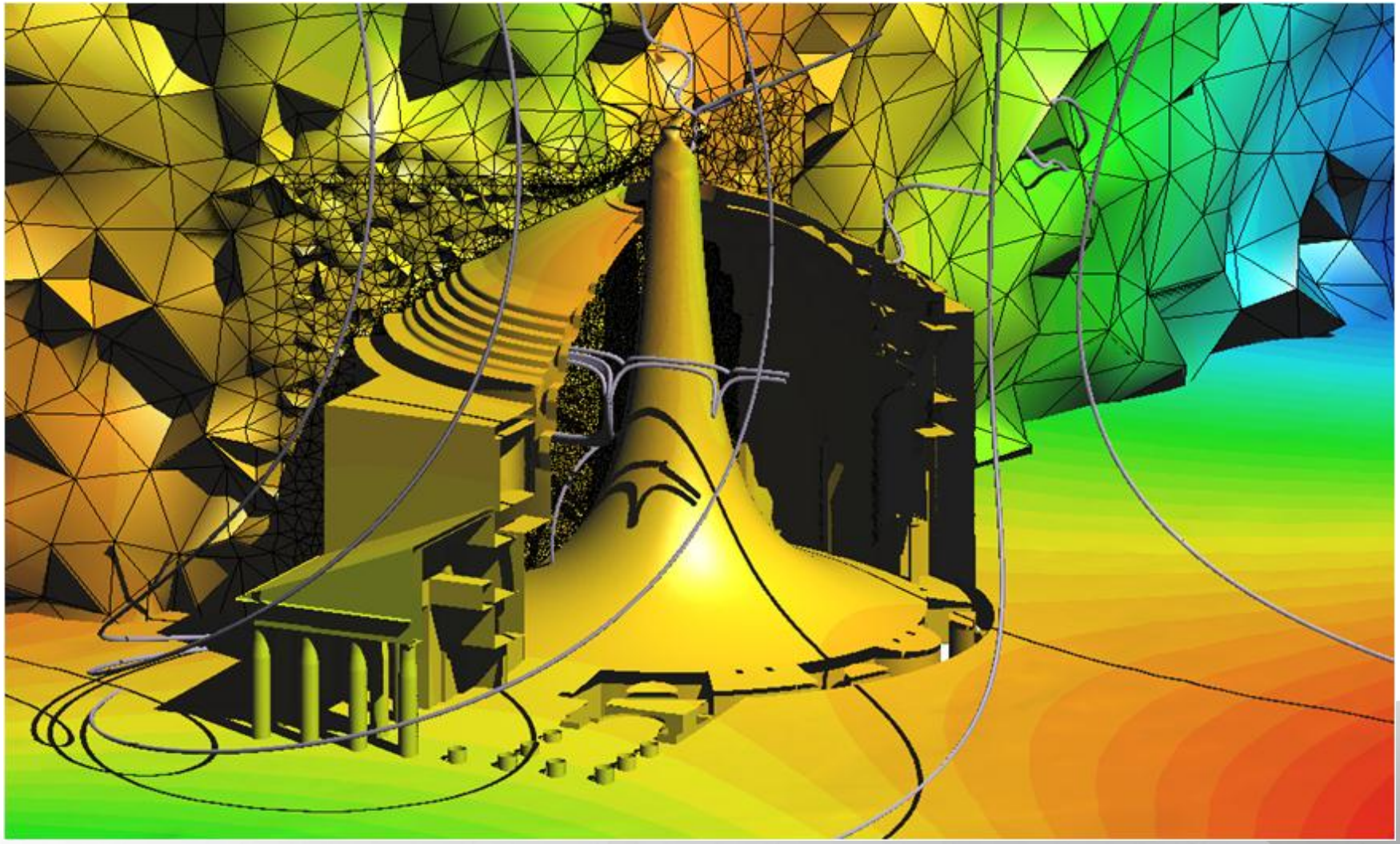
- All advanced viewing settings in one window:
  - Stereoscopic view
  - Shadows
  - Mirror

Stereoscopy



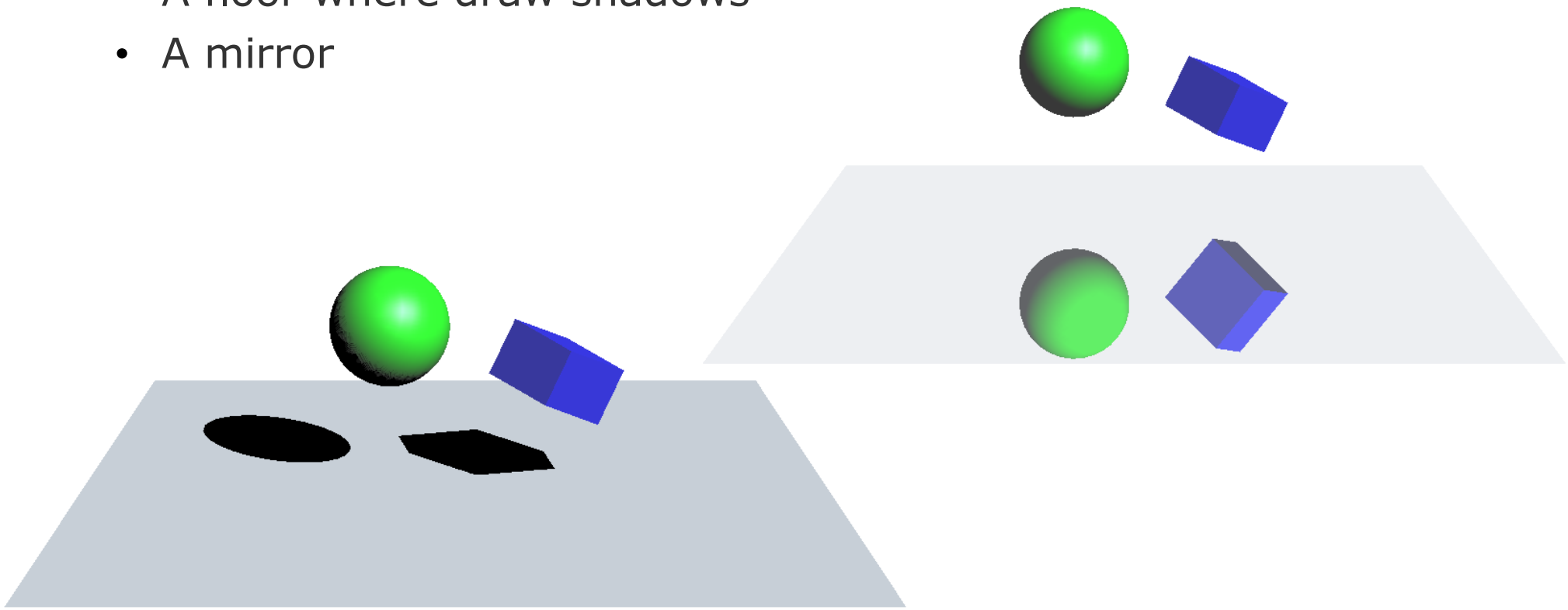
Shadows

Better depth perception



Ground plane

- Can be used as:
  - A floor where draw shadows
  - A mirror



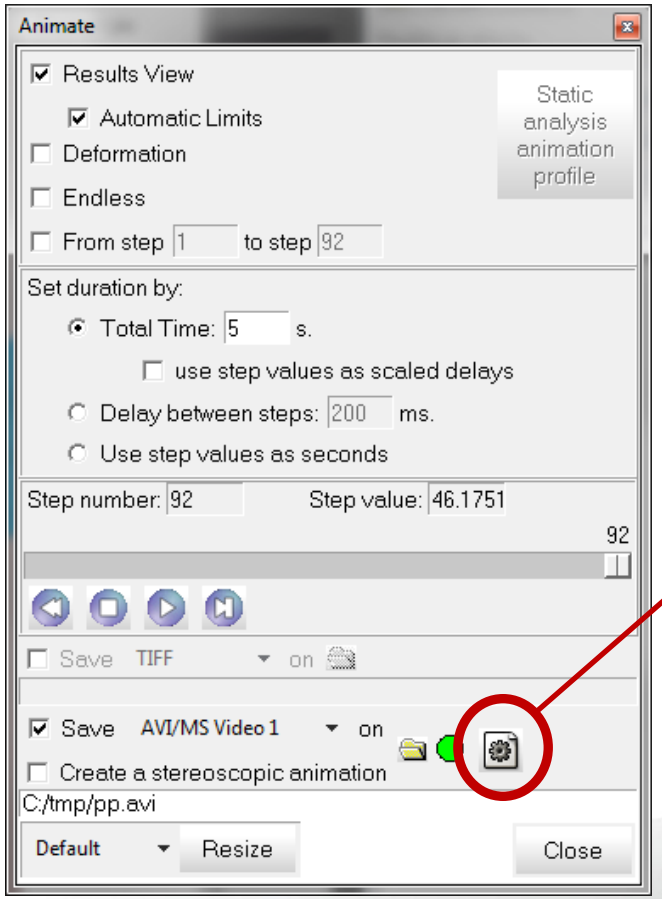
Batch post-processing: off-screen

- GiD with no interaction and no window
- Command line:

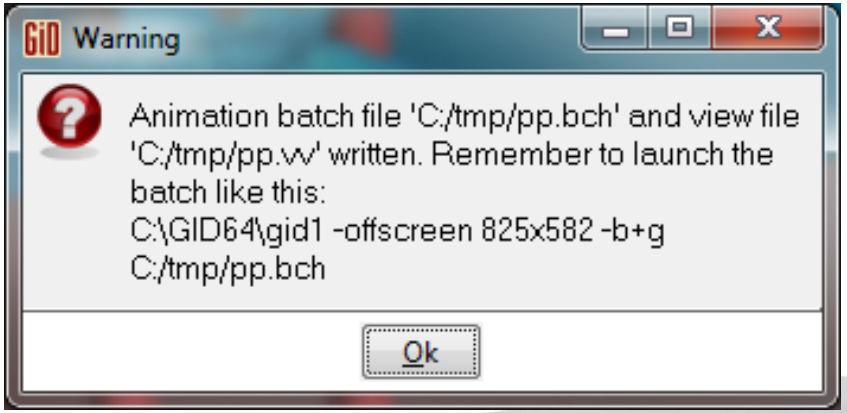
  gid -offscreen [WxH] -b+g batch_file_to_run
- Useful to:
  - launch costly animations in bg or in queue
  - use gid as template generator
  - use gid behind a web server: Flash Video animation
- Animation window: added button to generate batch file for offscreen-gid to be sent to a batch queue.

Batch post-processing: off-screen

- Animation window: added button to generate batch for offscreen-gid

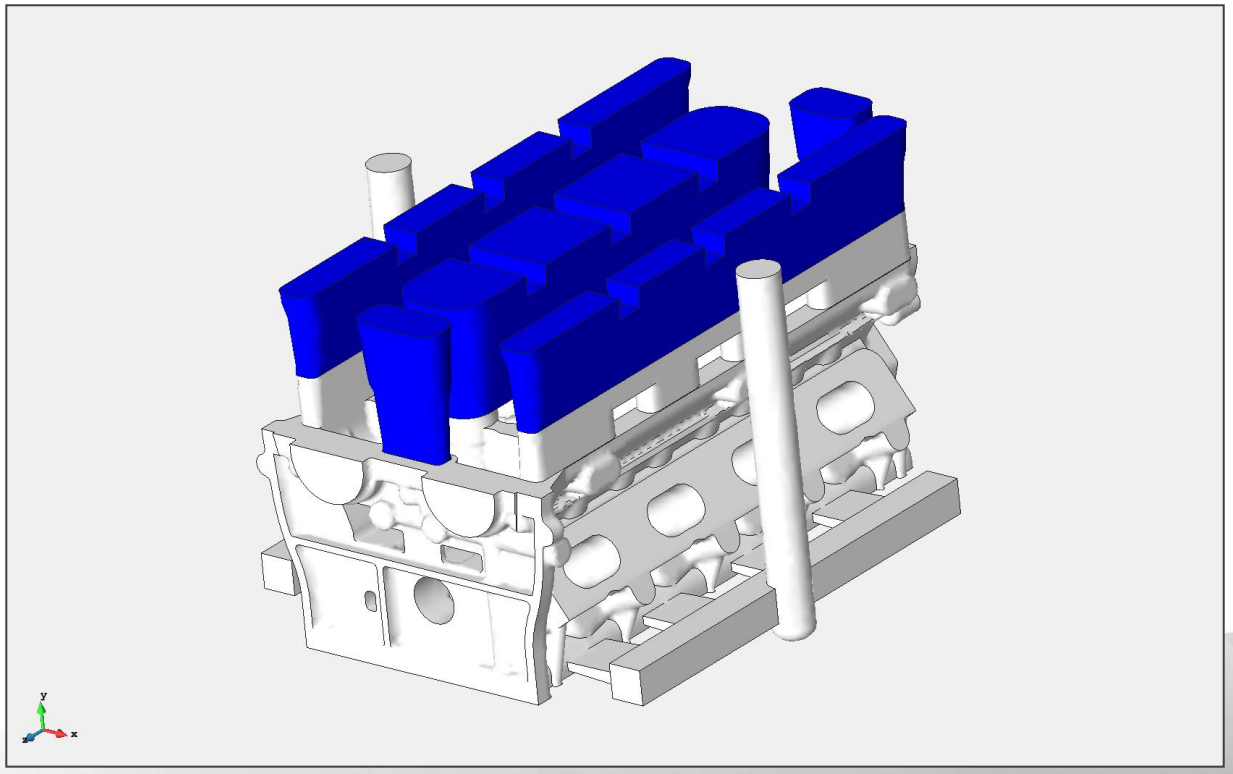


generates:
.bch - Batch to create animation file
.vv – view file storing current view



More incorporations

- Animation: new Macromedia Flash Video (.flv) format
- PDF output: now outputs images in .pdf format
- Dual monitor support
- Full-screen mode (F11):

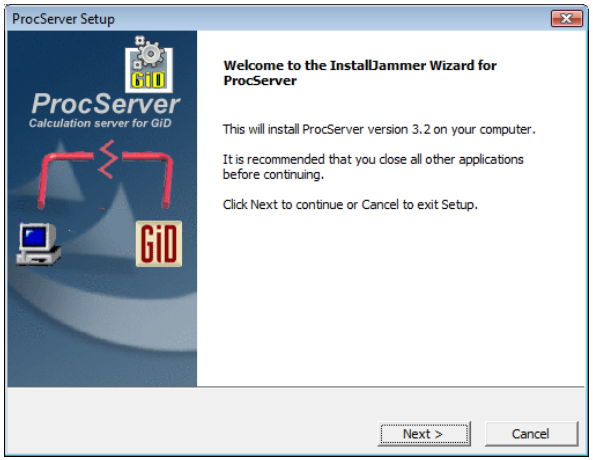


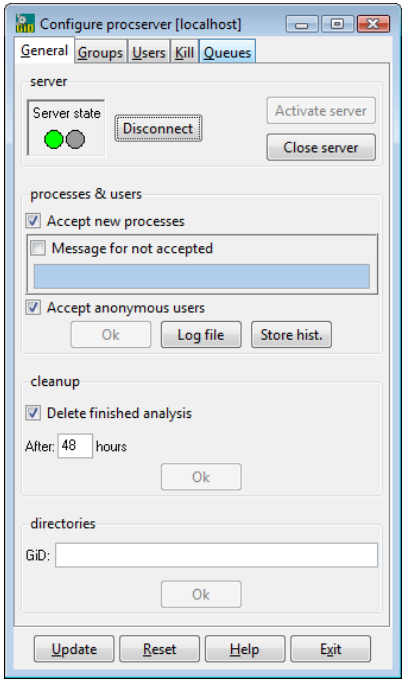
ProcServer

Remote calculation server for GiD

Continue the development of this tool.

Now versions 3.2 for Windows and Linux





Automatic check new versions of GiD

- Checking of new versions (checked automatically when opening GiD)