



# GiD v11 news

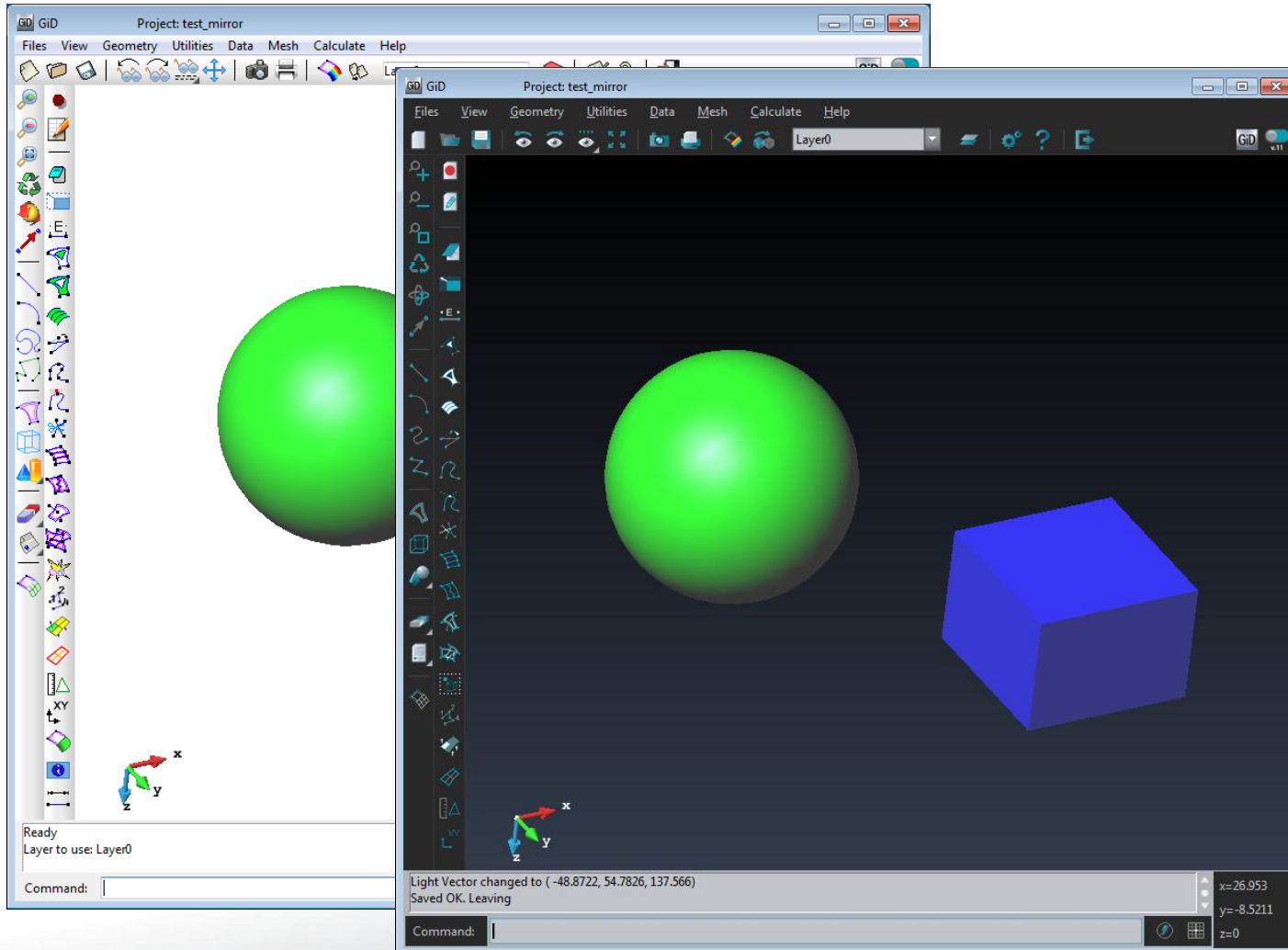
GiD developer Team

Miguel Pasenau, Enrique Escolano, Jorge Suit Pérez, Abel Coll, Adrià Melendo and Anna Monros.

# New look for the GUI

GiD

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



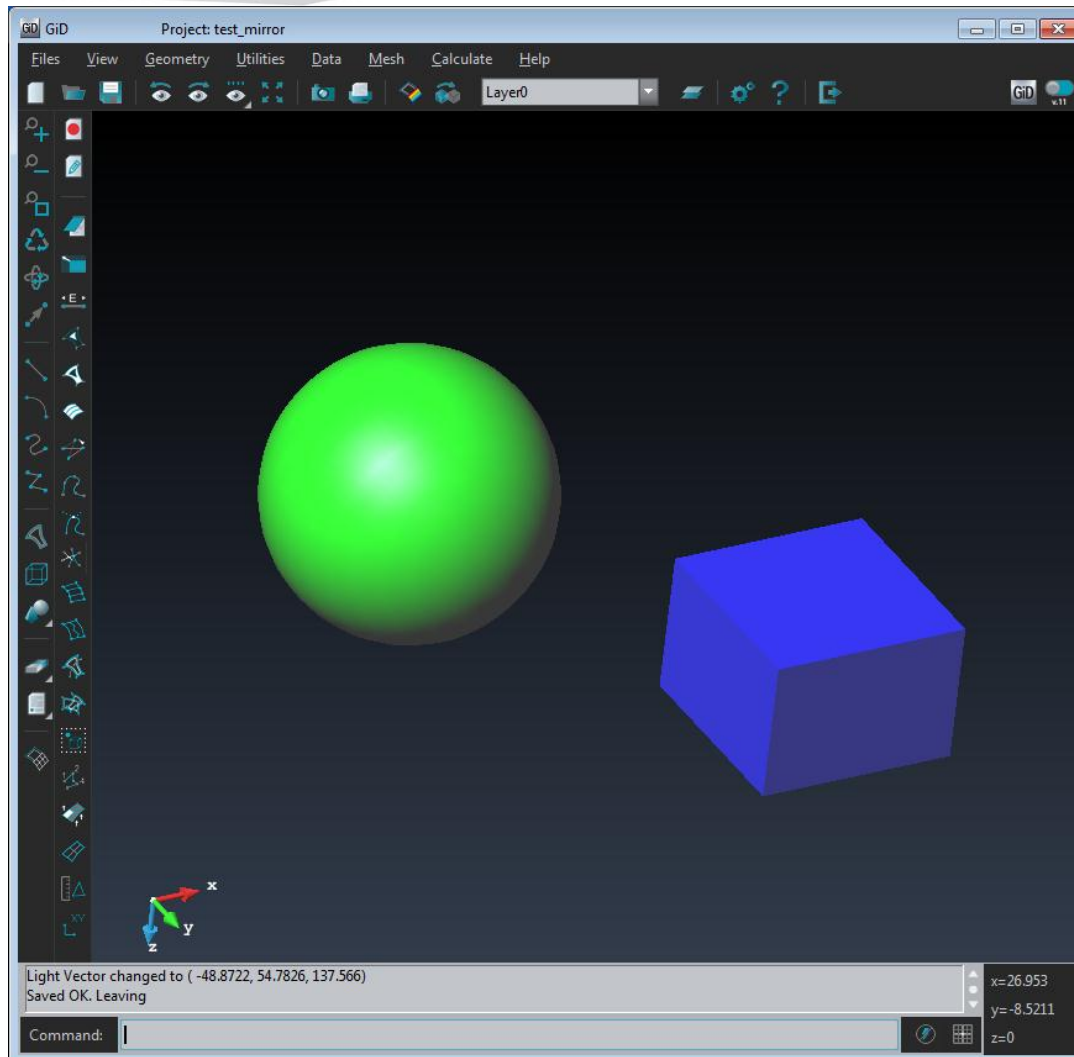
## Advantages of Dark theme:

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



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

## Advantages of Dark theme:

Windows and icons look unified.

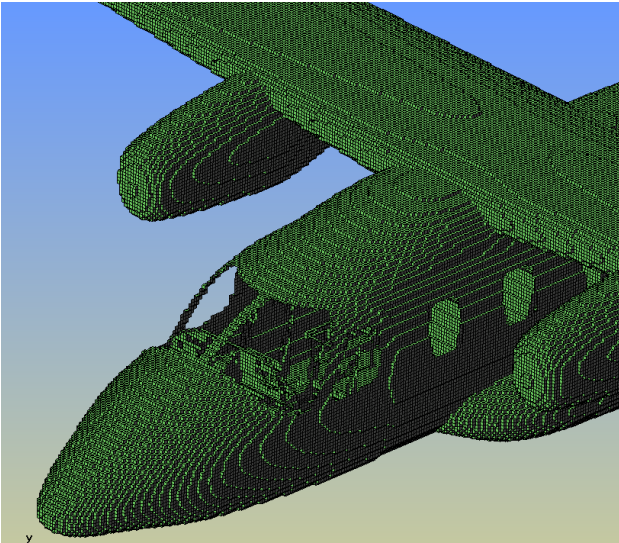
Professional-cool look that makes GiD more appealing for new users.

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

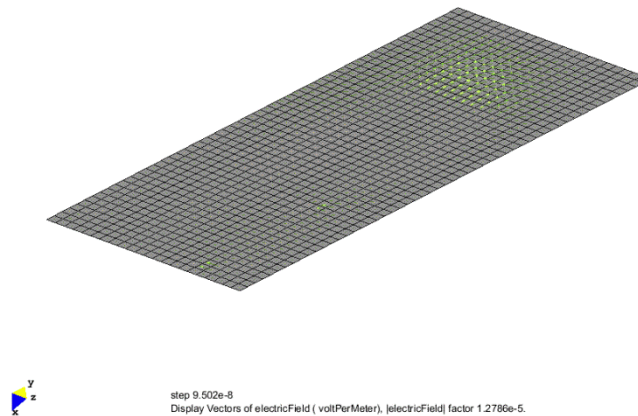
# Import/export



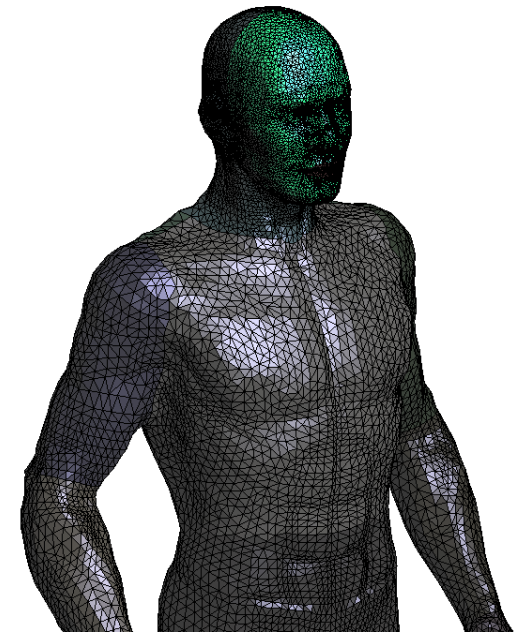
- EMA3D (CadFix) cartesian mesh import
- Amelet mesh and results import/export (pre and post)
- STAR-CD mesh import



CadFix cartesian surface mesh



Amelet cartesian mesh and results



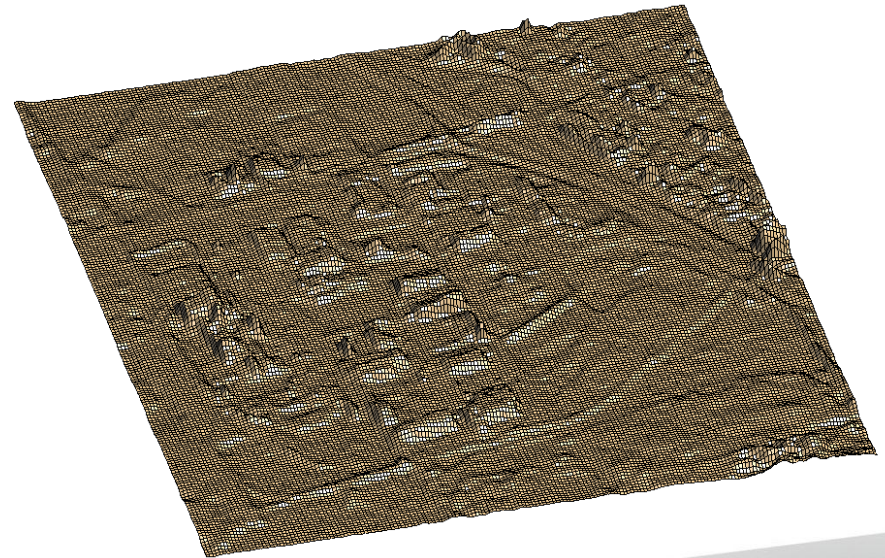
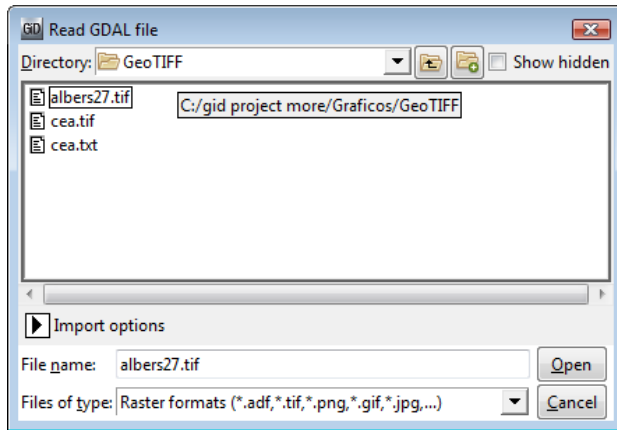
STAR-CD unstructured mesh

These importers are implemented as Tcl plug-ins



# GDAL import

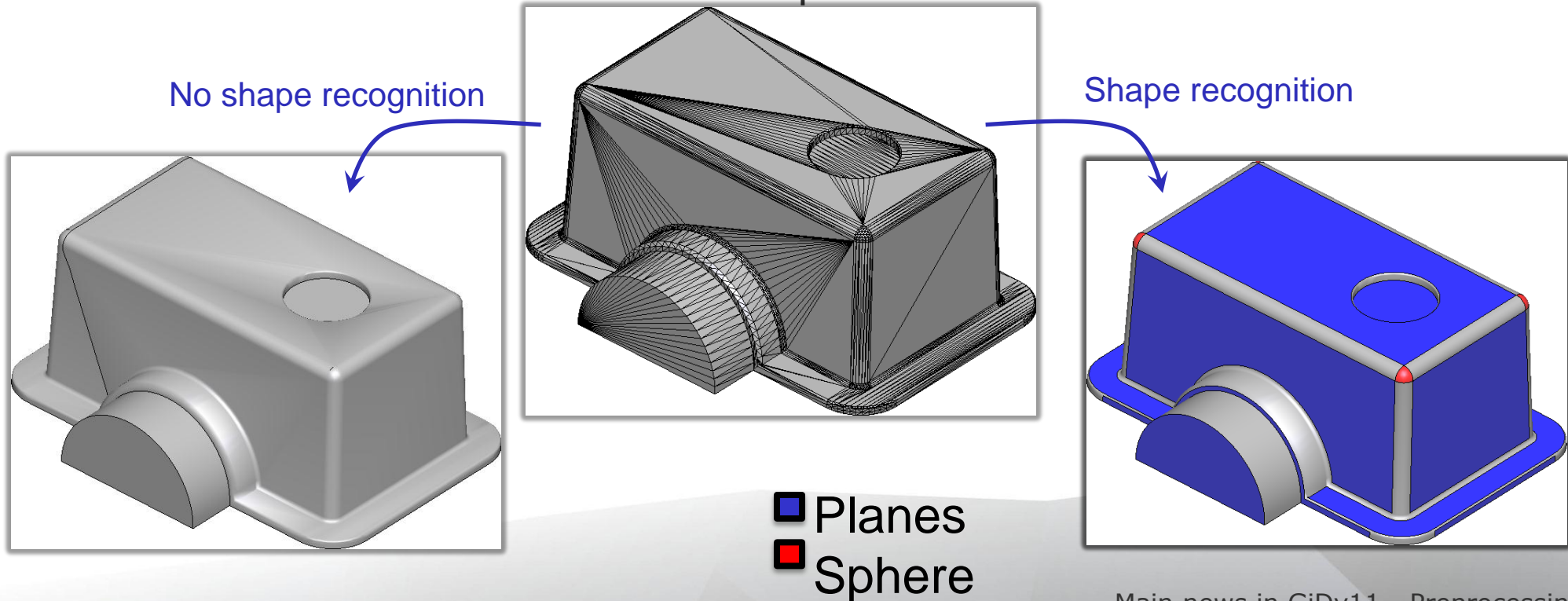
Plug-in to import raster files as geometry or mesh.  
To read and write GIS digital terrain models from multiple formats (Arc/Info, tiff, and most image formats).



# Shape recognition



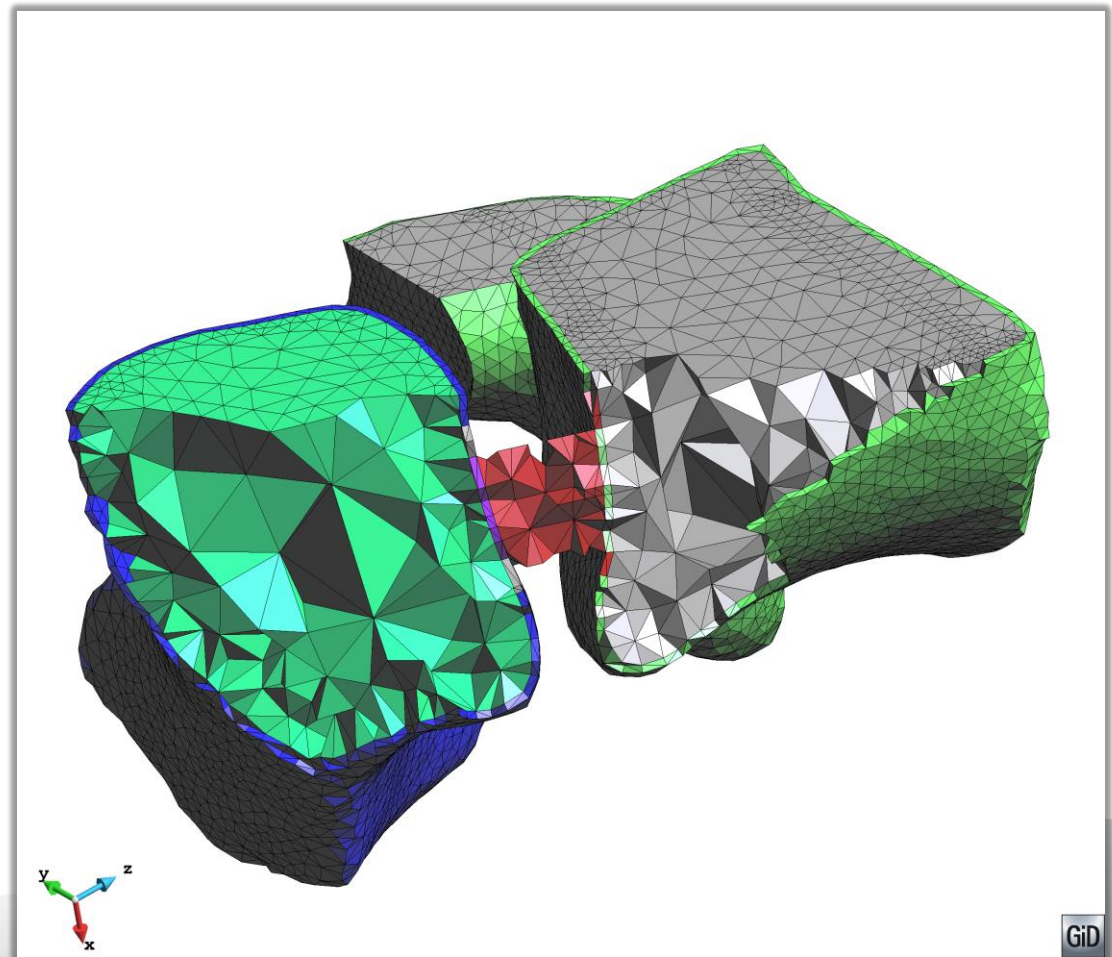
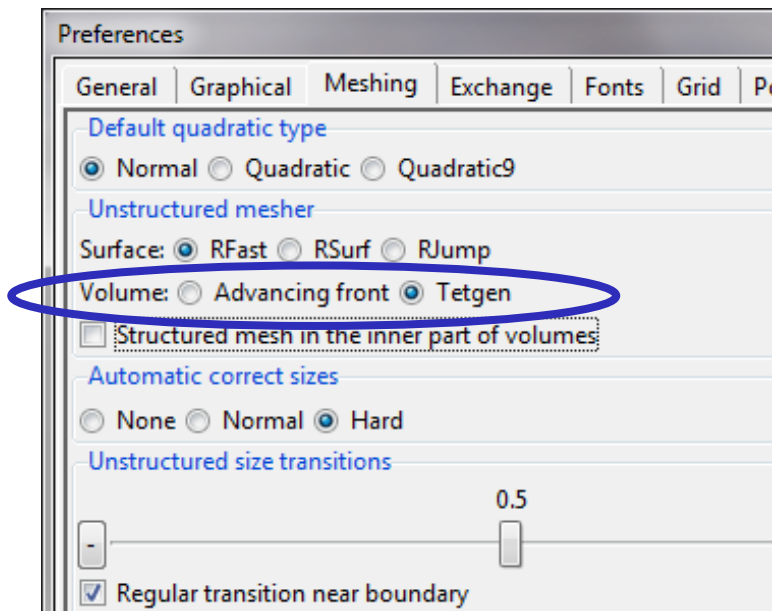
- Process for reconstructing geometry from mesh
  - Create patches of surface elements separated by sharp edges
  - Separate automatically independent patches following recognizable shapes (planes, spheres, etc...)
  - Create NURBS from elements patches



# Tetgen mesher inside GiD



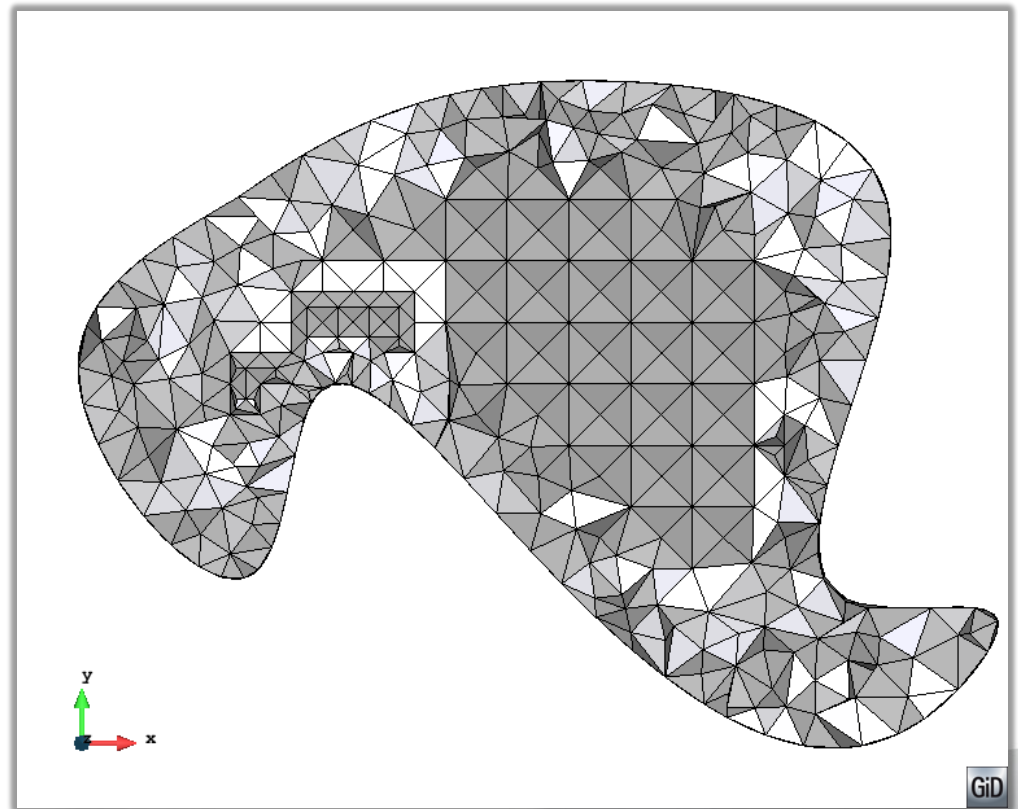
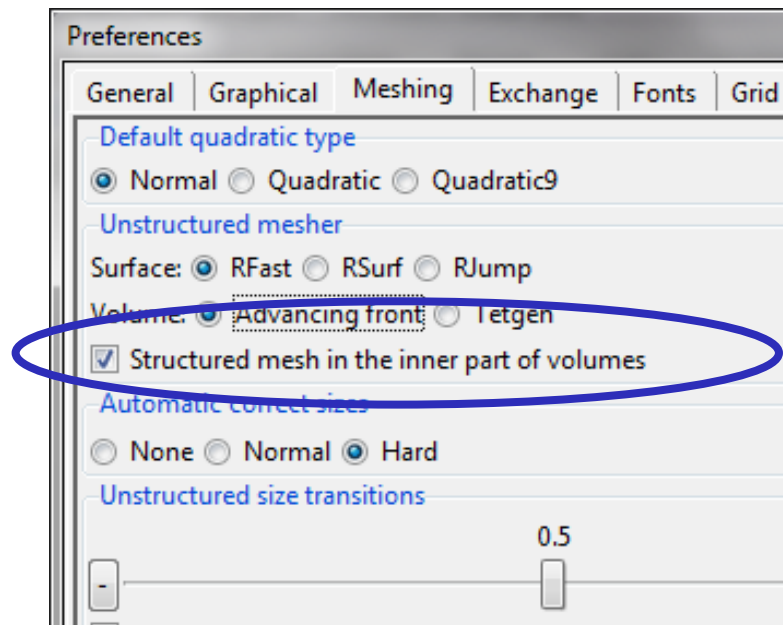
Mesher developed at WIAS Institute (Berlin) based in Delaunay.



# Structured mesh for inner part of volumes



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

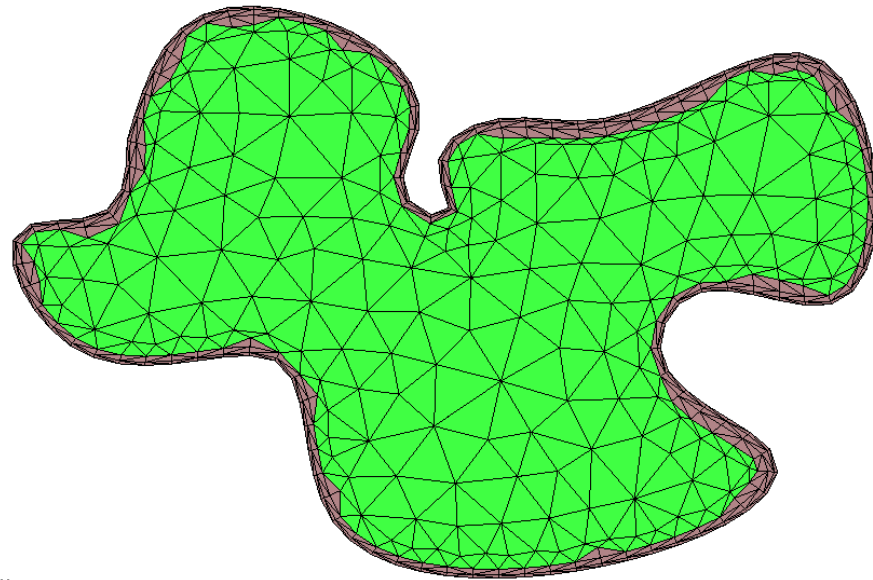




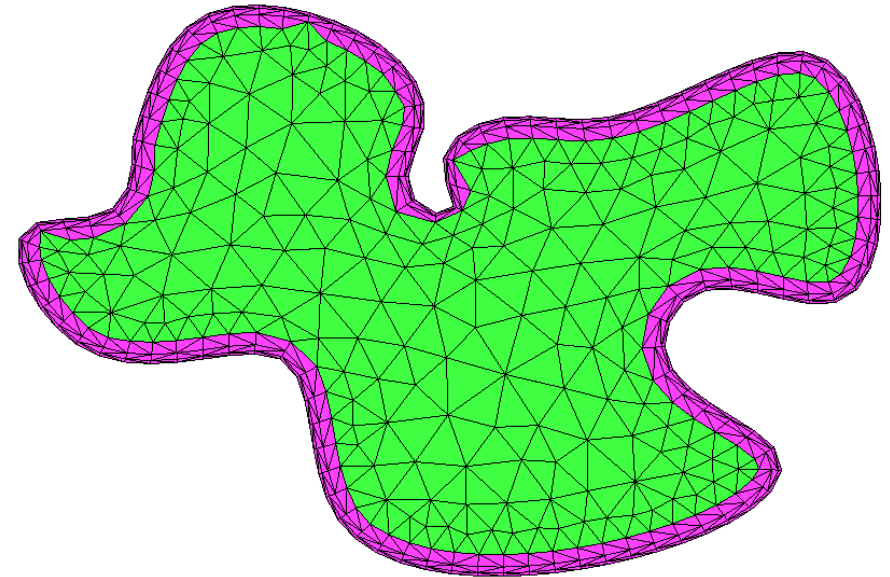
# Improvements in boundary layer mesh



Try to respect more the number of layers



before

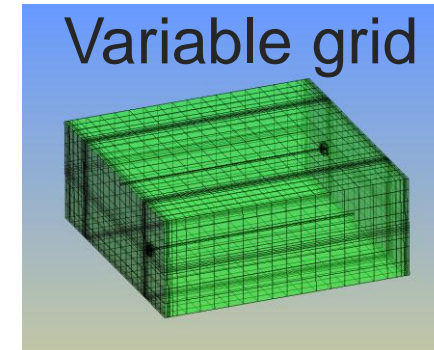
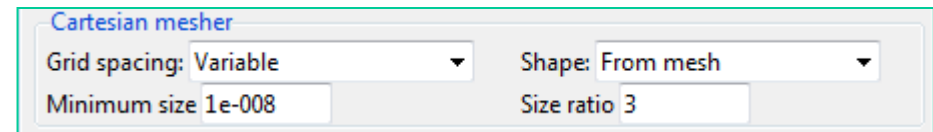
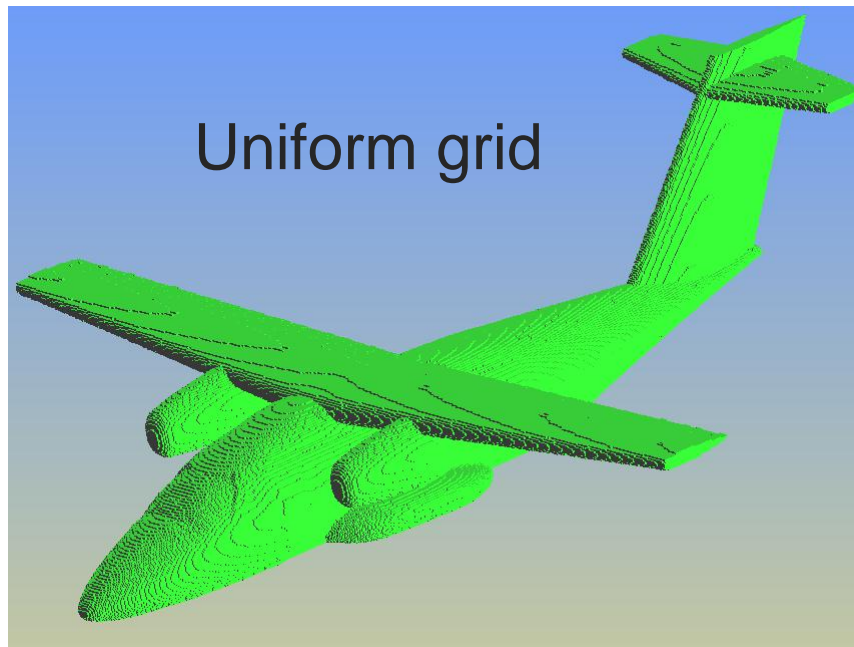


now

# Cartesian mesh



Enhanced 'scan-conversion' based volume mesher  
Non-uniform grid, quality of size ratios, ...



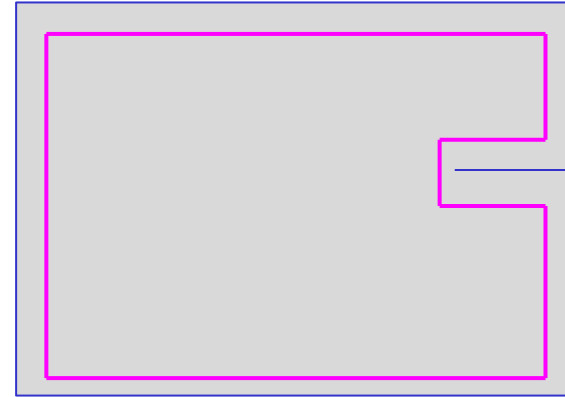
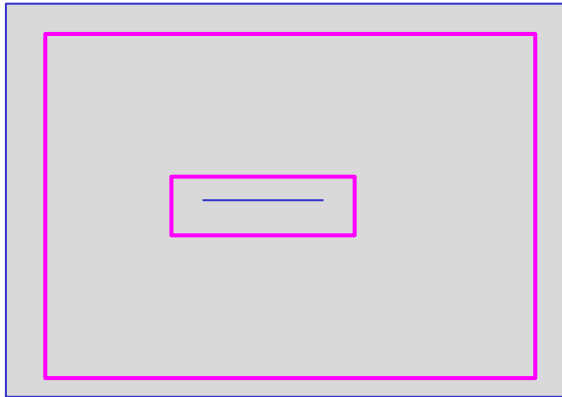
(max size ratio=2)

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.

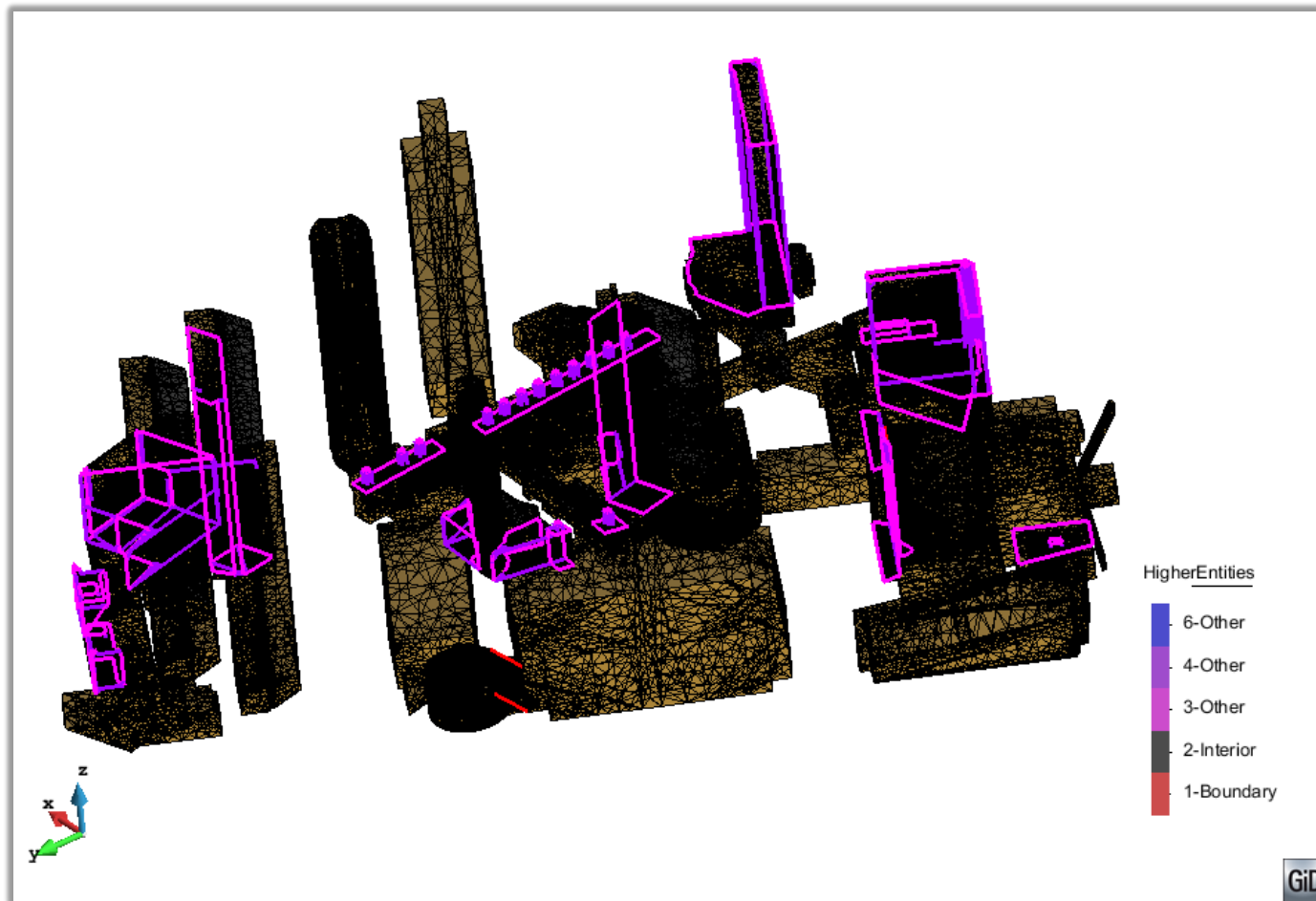


- Now the intersection operation doesn't need 'artificial' splitting of surfaces
- Now the result of intersections is more independent on the steps followed
- Meshing adaptation to '1D holes'

# Draw higher entities on mesh edges



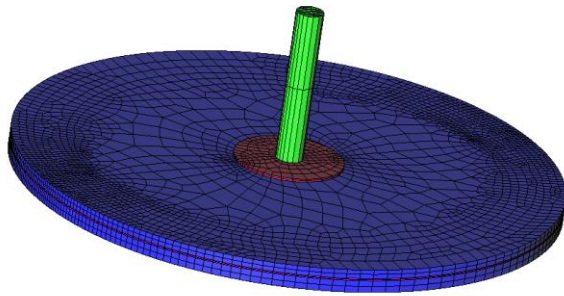
Useful to check mesh topology



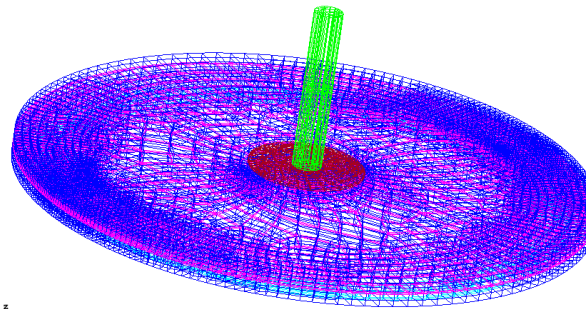


# Normal render for meshes

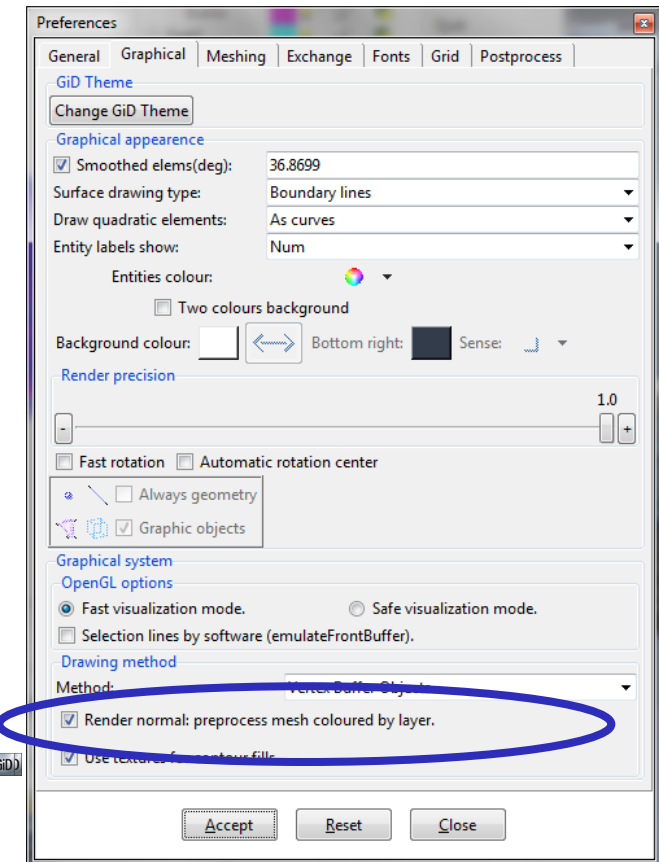
- Normal render mode: meshes can be drawn with their layer's colour



Render flat



Render normal



- 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

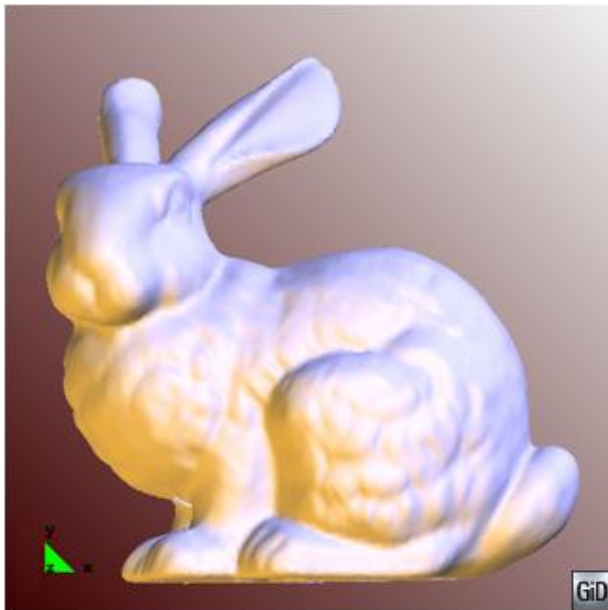


- Improvements in
  - Unstructured quadrilateral mesher
  - Advancing front surface mesher
  - Semi-structured mesher
  - Boundary layer mesher

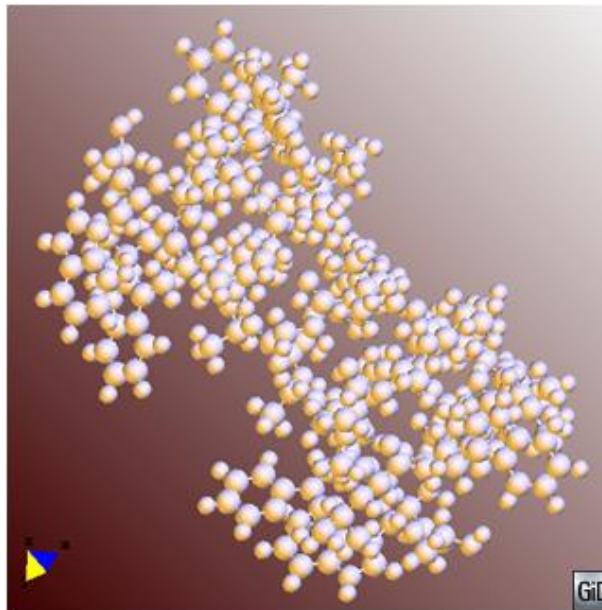
# Obj, Off & Ply import

plug-ins to import in postprocess mesh and results

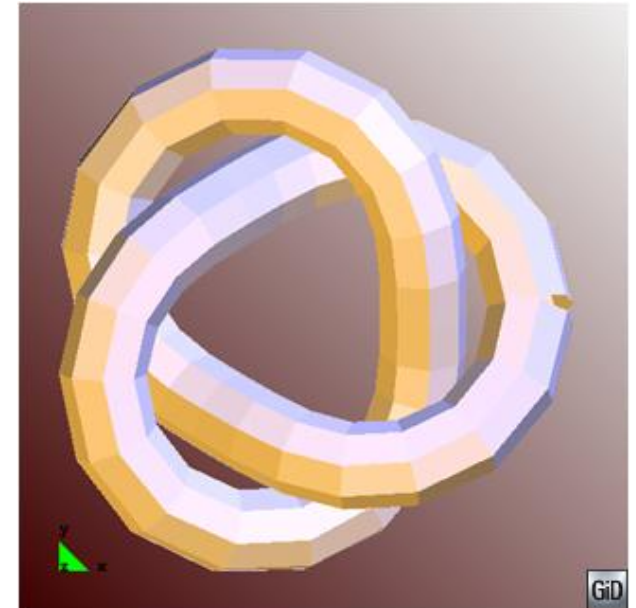
- OBJ: Object format, from Wavefront Technologies
- OFF: Object file format, from Geomview
- PLY: Polygon file format, from the Stanford graphics lab.



Stanford's bunny ply example



Y9135\_diagram obj example

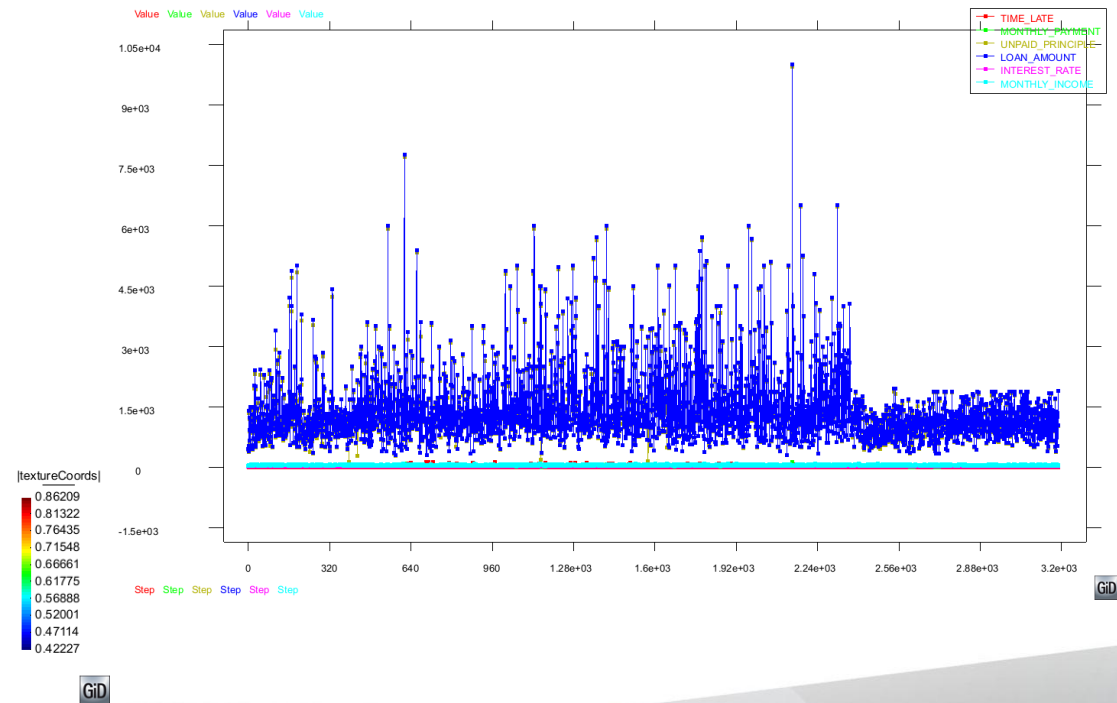
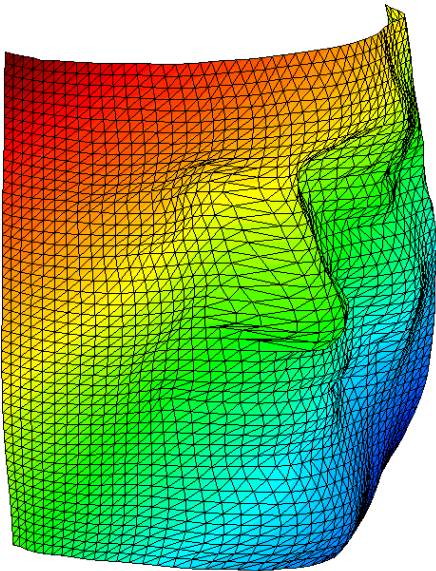


Tre off example



# 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

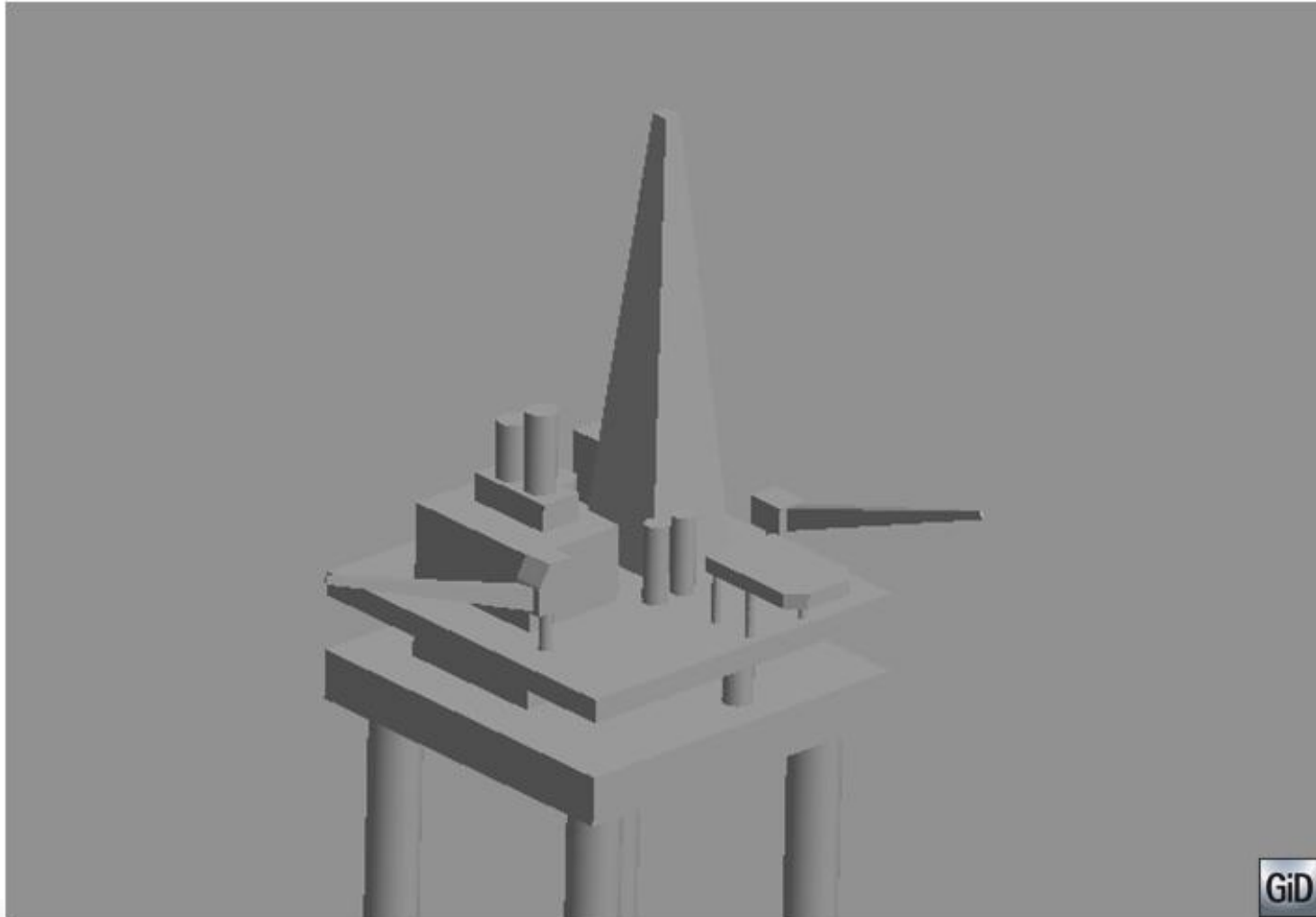


- Extract boundaries: creates new layer with the skin of the volume mesh, or edges of surface mesh
- Separate connected components:
  - New layer for each independent mesh
  - New layer for each set of elements limited by boundary edges
  - Uses colouring
  - Utilities → Variables → PostMaxNumComponents

# Mesh + Results: mesh operations



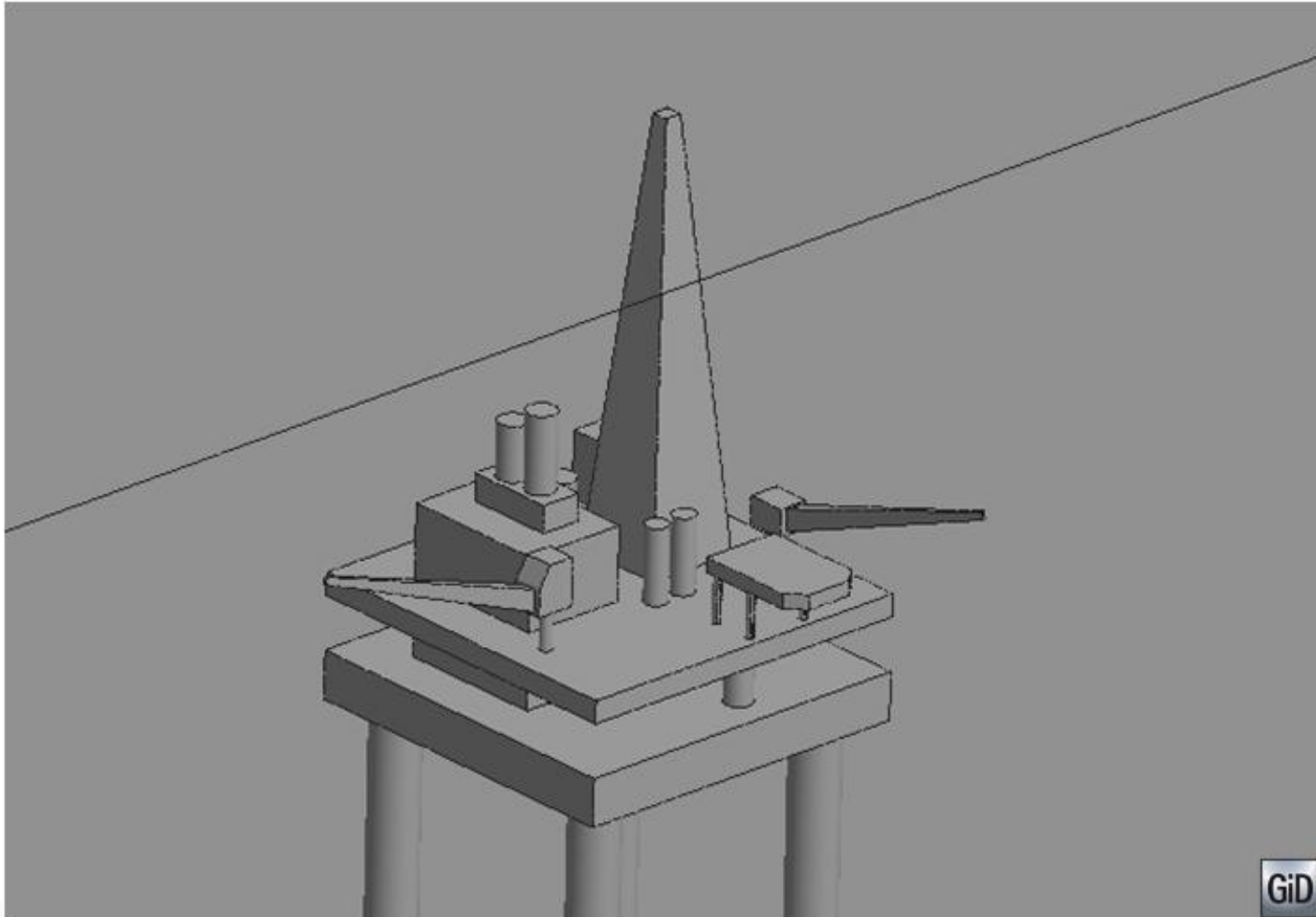
Platform ( kratos): single volume mesh



# Mesh + Results: mesh operations



Options → Geometry → Extract boundaries

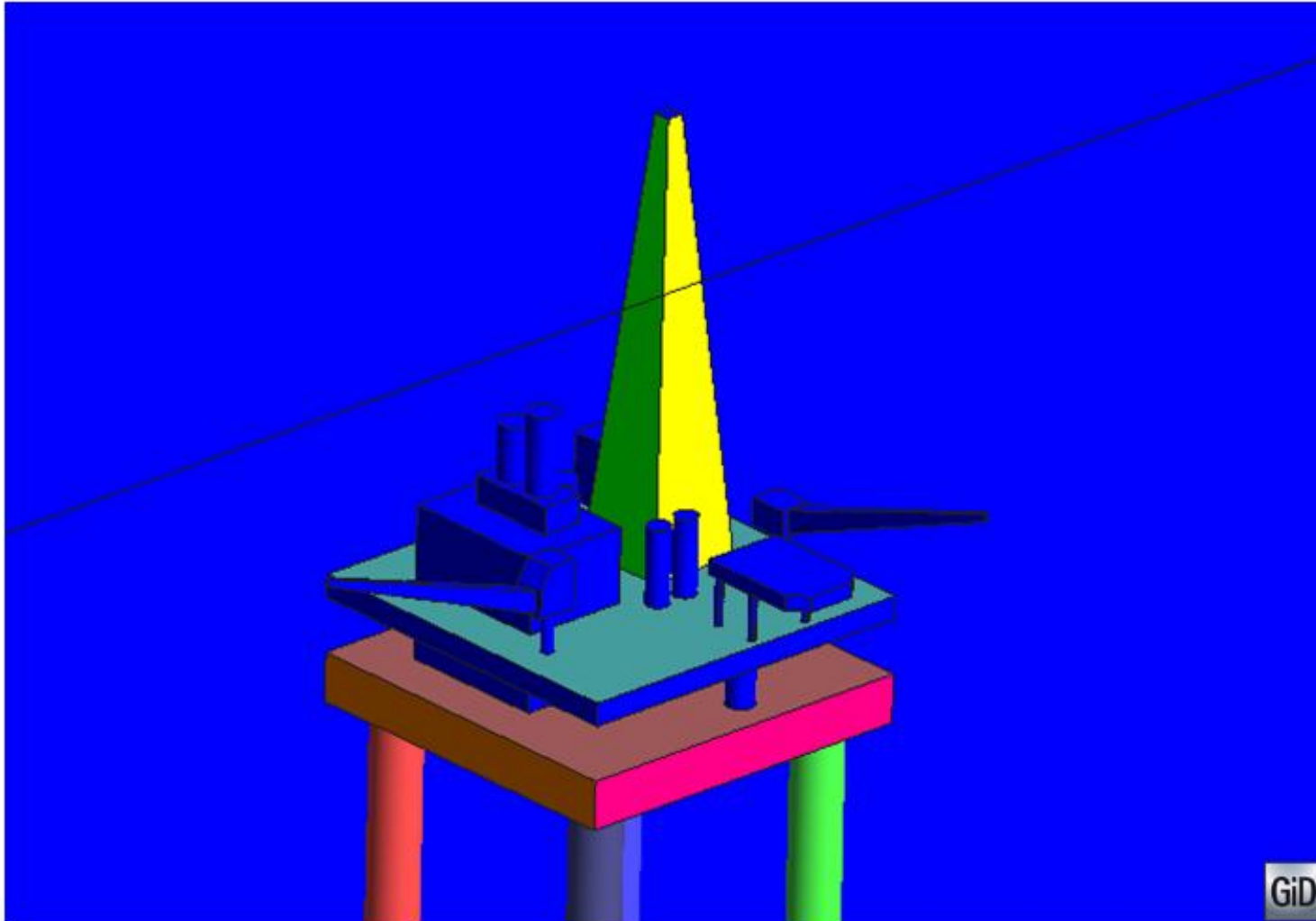




# Mesh + Results: mesh operations



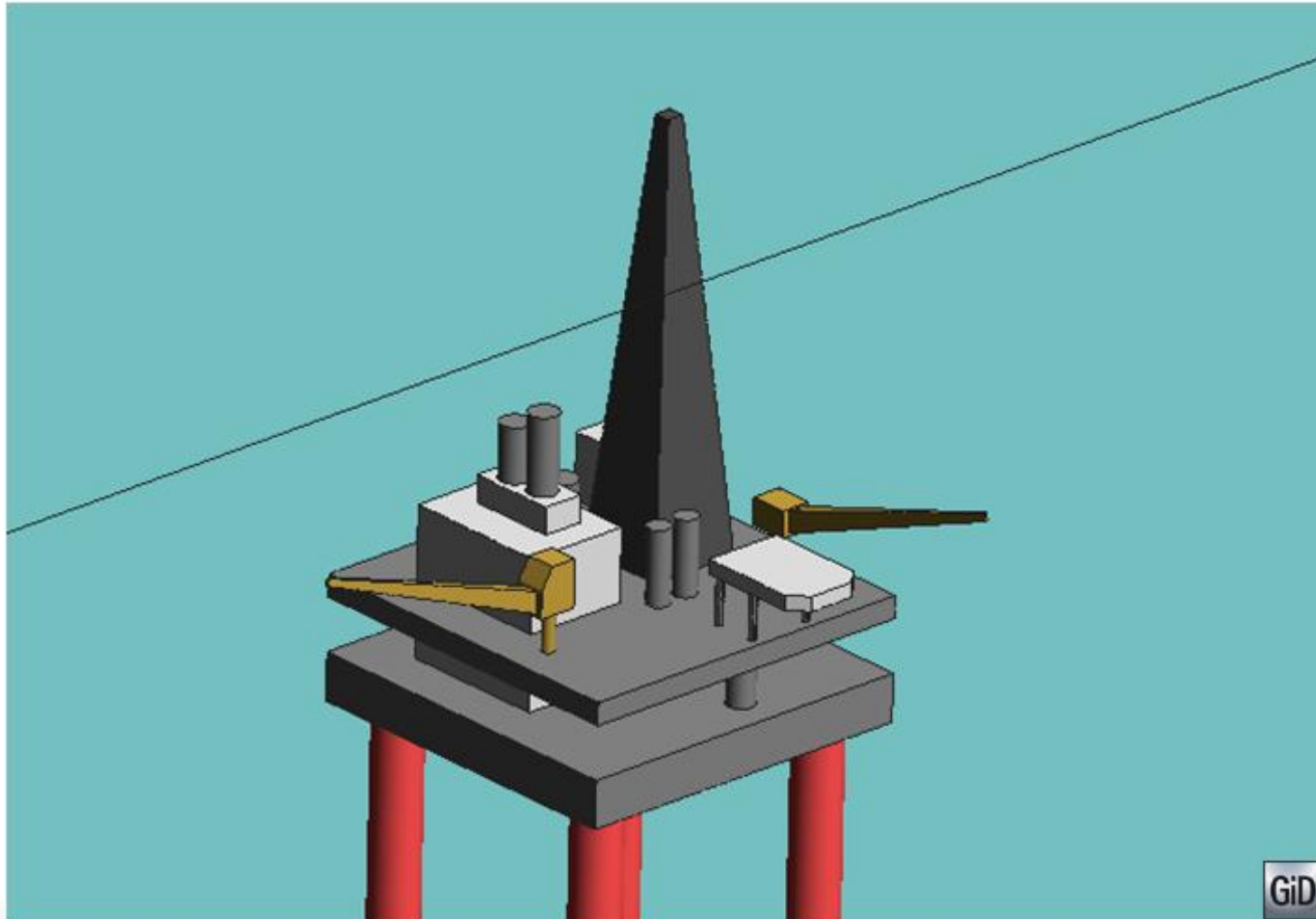
(...) → Separate connected components



# Mesh + Results: mesh operations



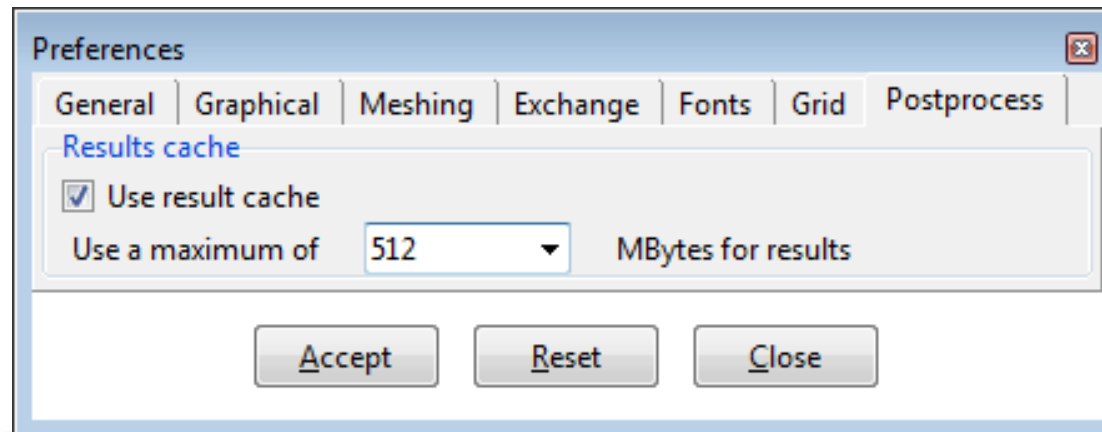
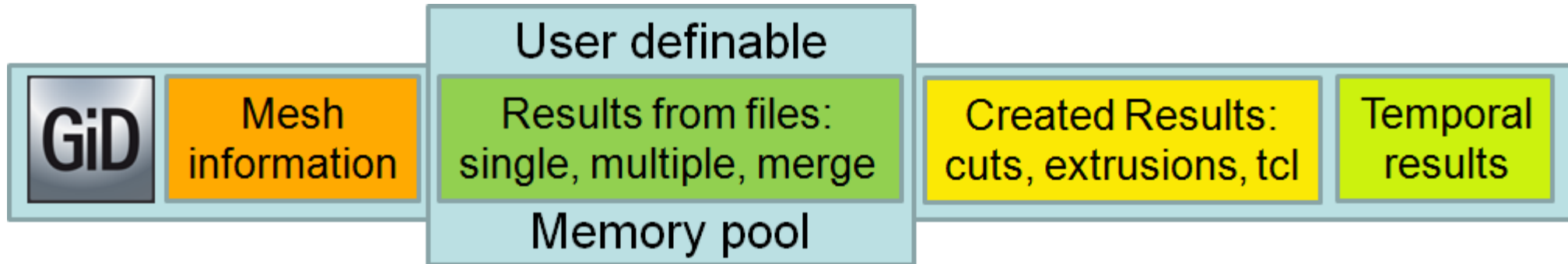
Divide by selecting elements



# 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



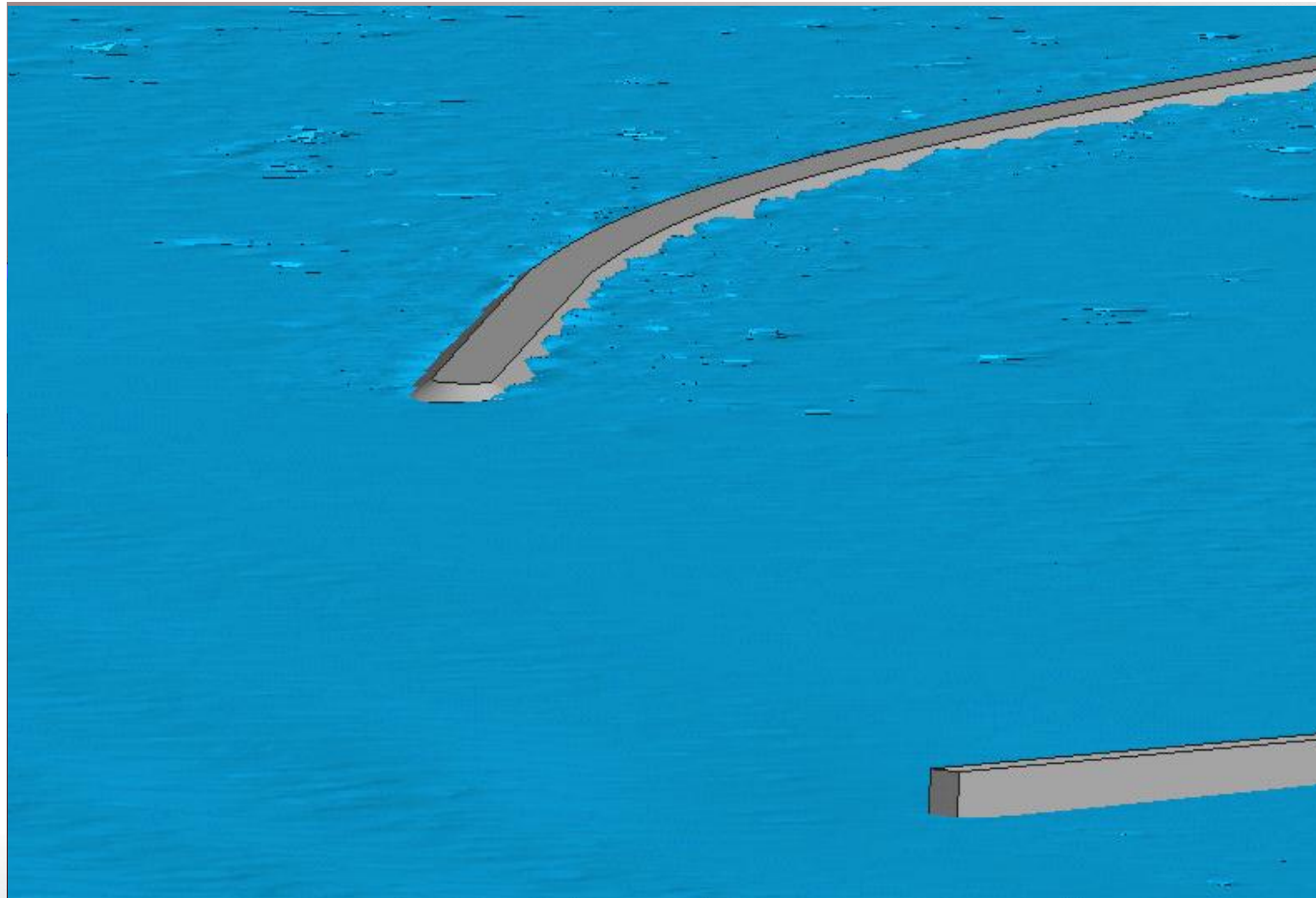
- **How it works:**
  - Verifies result's file(s) and gets result's position in file and memory footprint
  - Loaded on demand
  - Touch on use
  - Oldest results unloaded if needed
  - Results of latest analysis step in memory
- **What's not cached:**
  - Results for cuts, extrusions, iso-surfaces when 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  $\sim 104$  GBytes
  - With 2GB result's cache: 3.16 GB memory usage

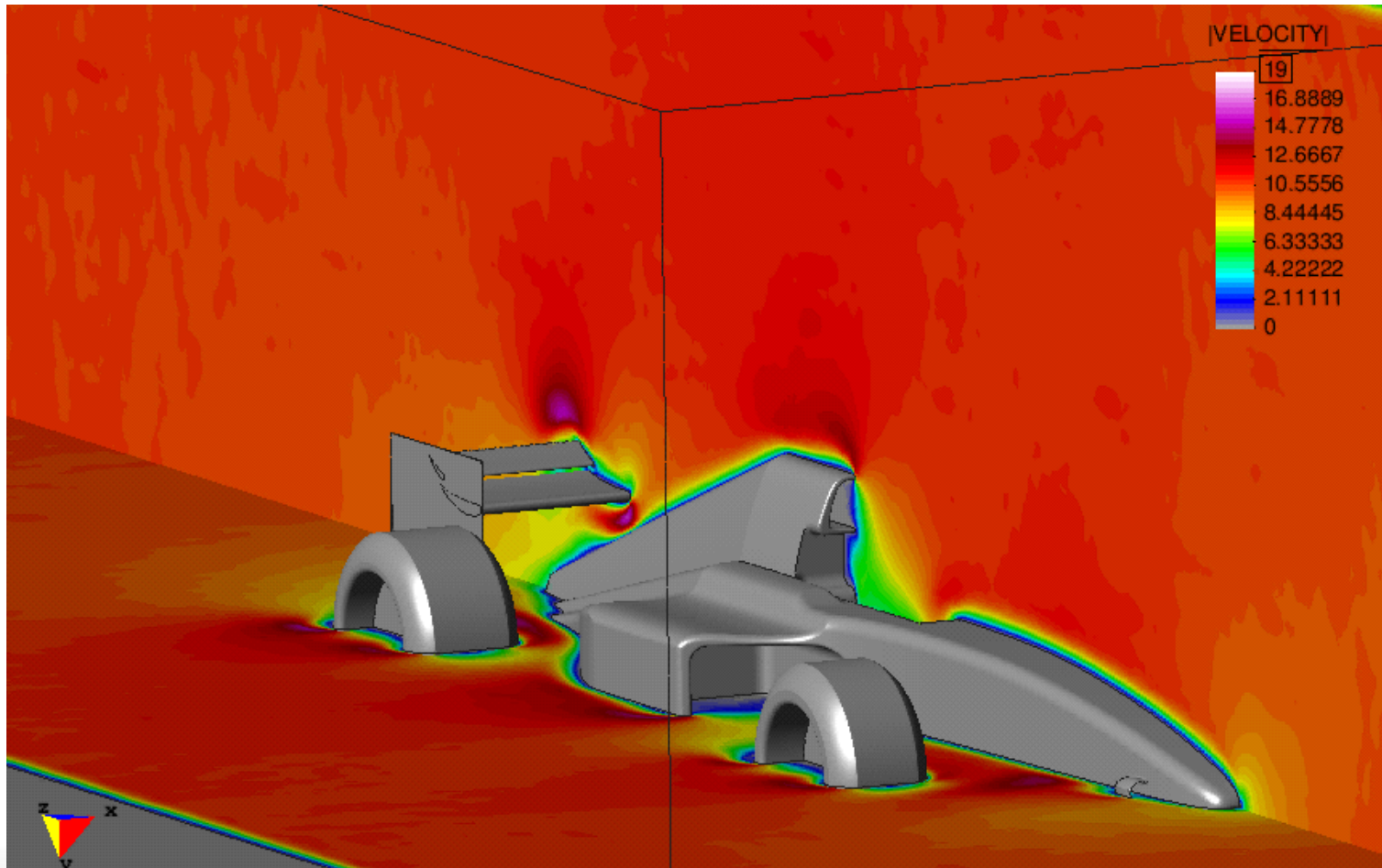


1.307.389 nodes  
6.852.005 tetrahedrons  
2.292 time-steps

# Large files: result's cache



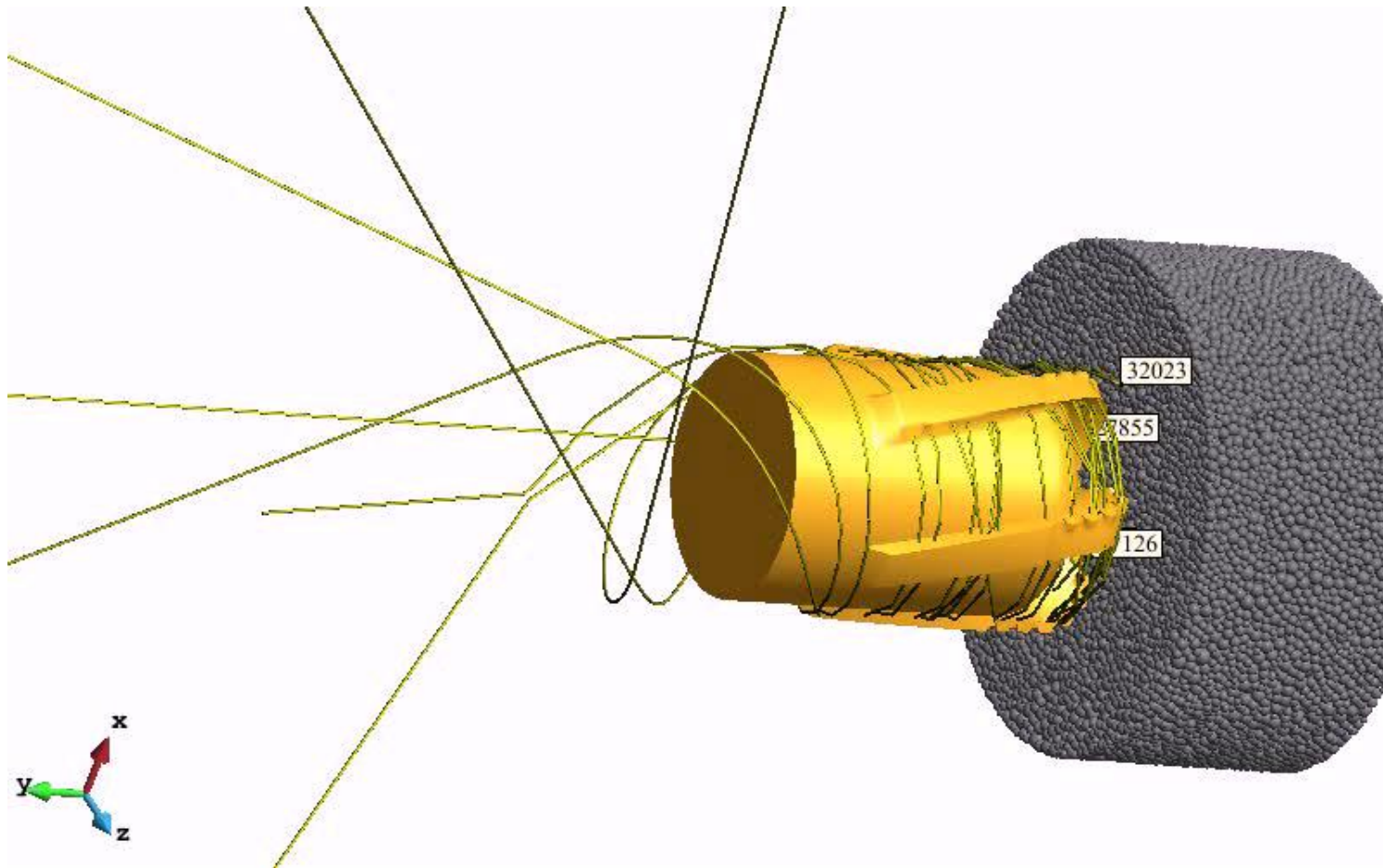
- Successful stories:
  - Racing car model: 103.671.344 tetrahedrons



# Node tracing



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



- **Complex 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 selectable for:
    - display vectors,
    - line diagrams,
    - stream lines,
  - Complex point evolution:  $x = \text{real}$ ,  $y = \text{imaginary}$

# Complex results



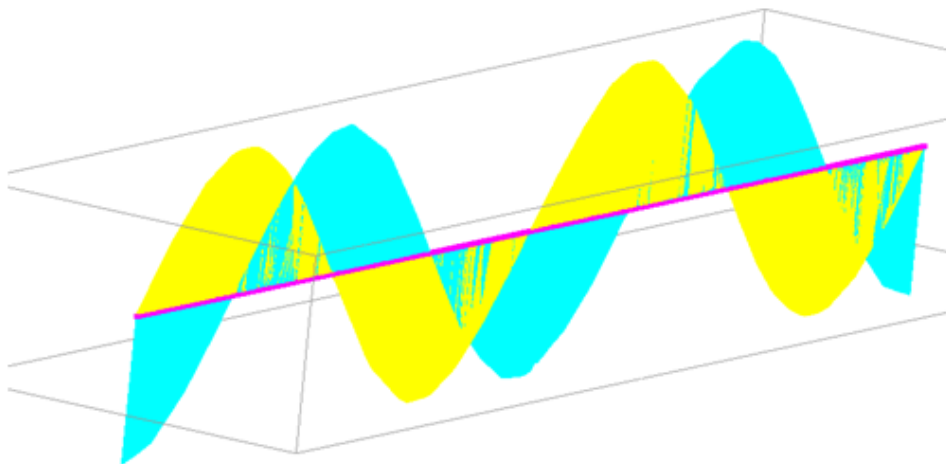
Result "Complex//E" "ERMES" 0 ComplexVector OnNodes

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

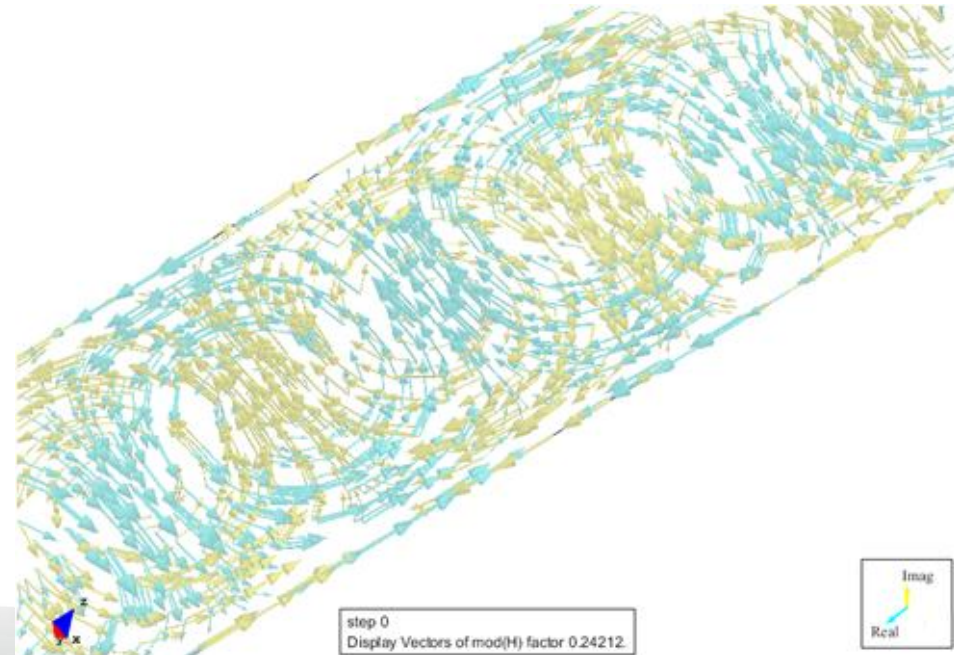
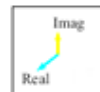
Values

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



step 0  
Vector Line Diagram of factor 0.00051393.



step 0  
Display Vectors of mod(H) factor 0.24212.

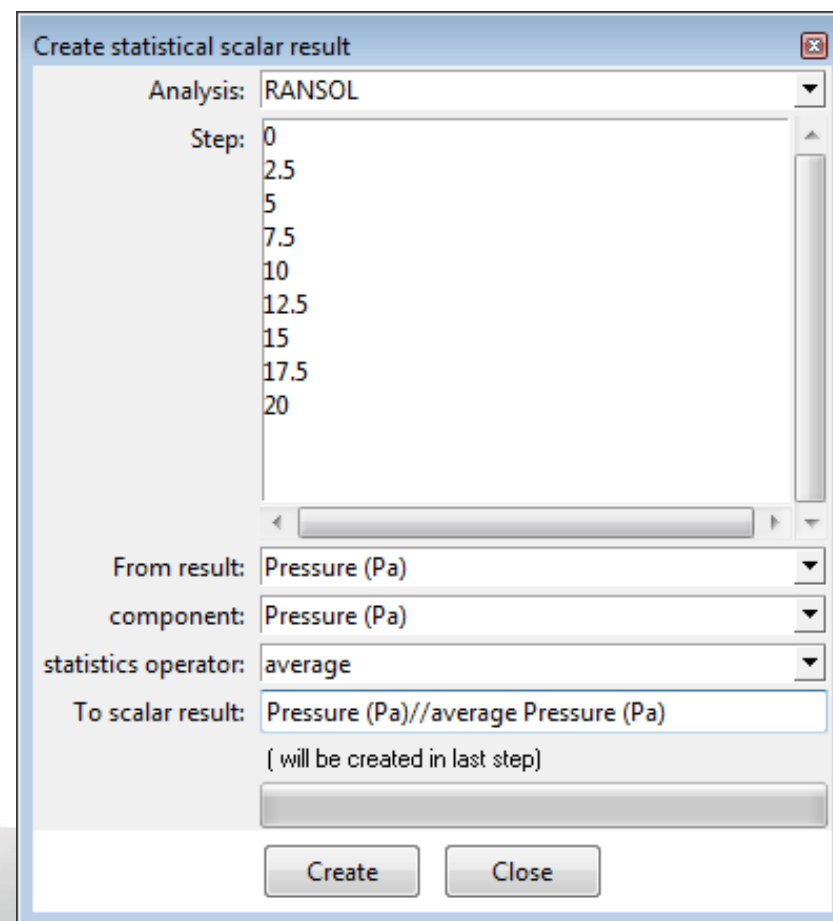
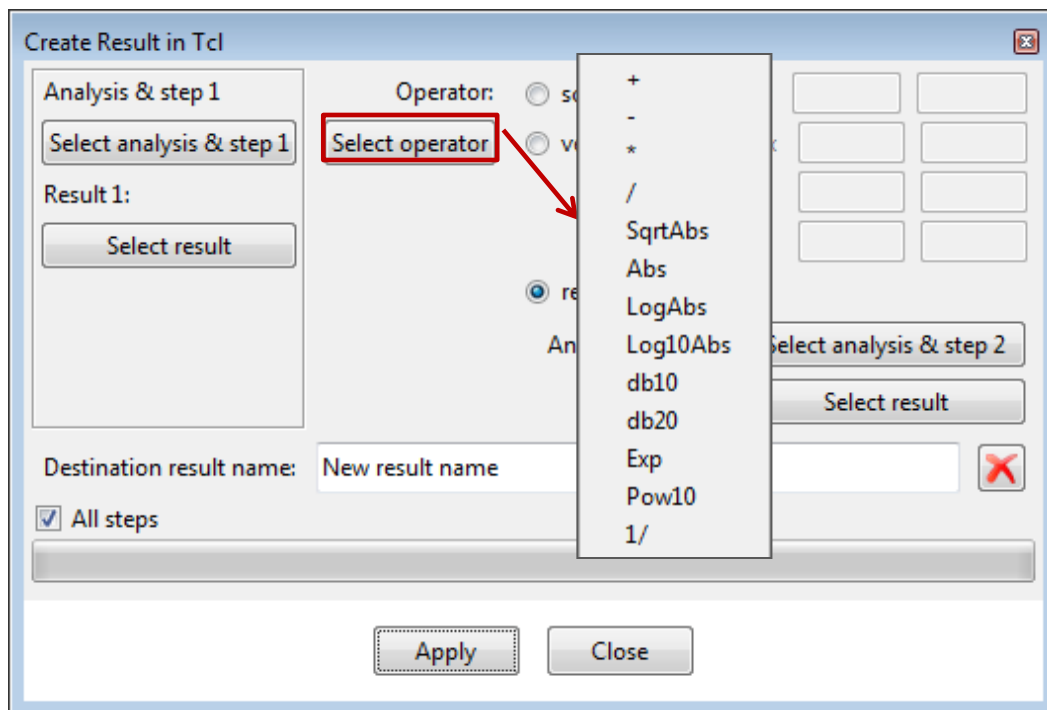




# Create results



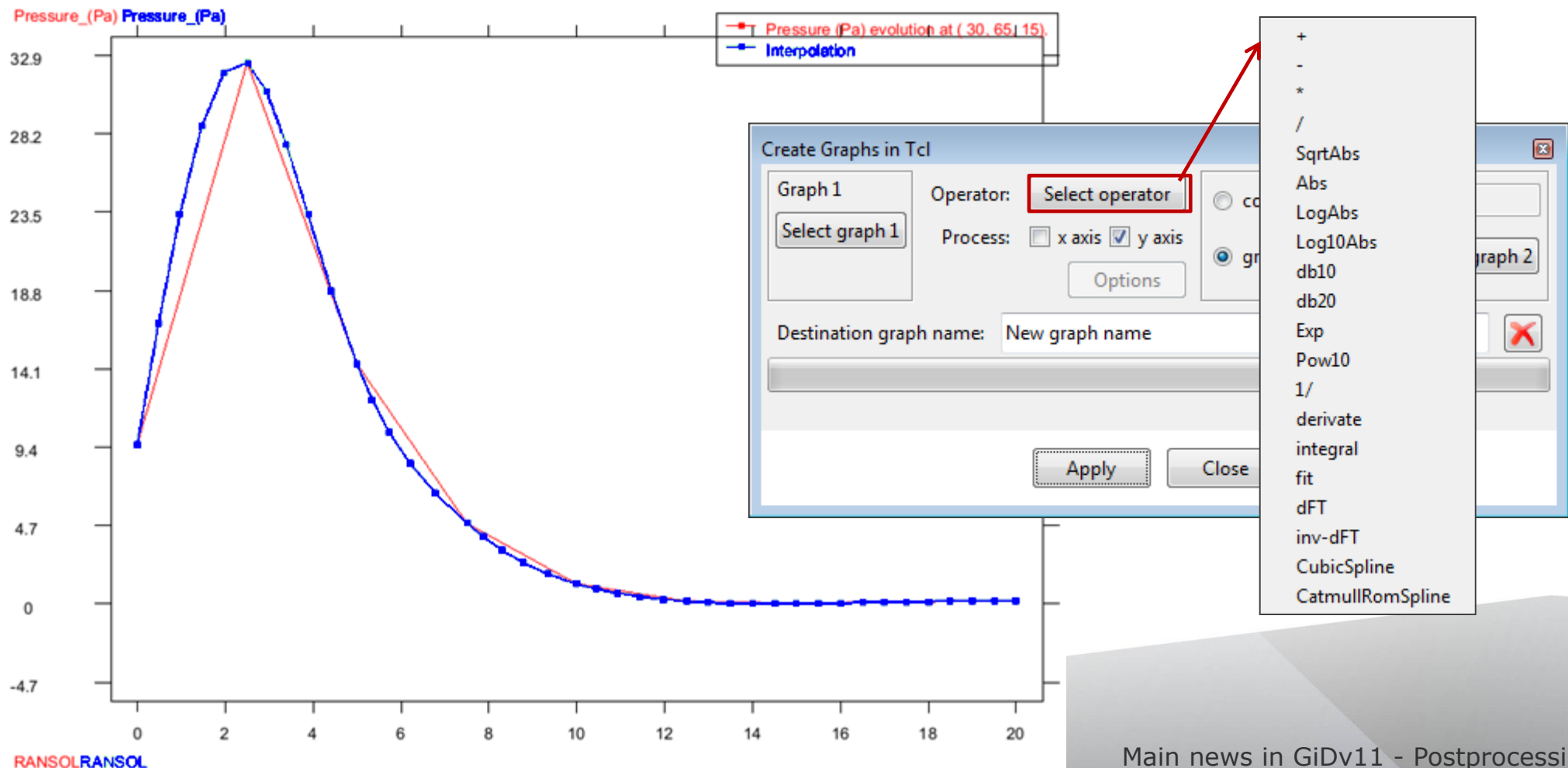
- Window to create results for all steps in analysis
- Statistical scalar results:
  - minimum, maximum,
  - average,
  - the standard deviation





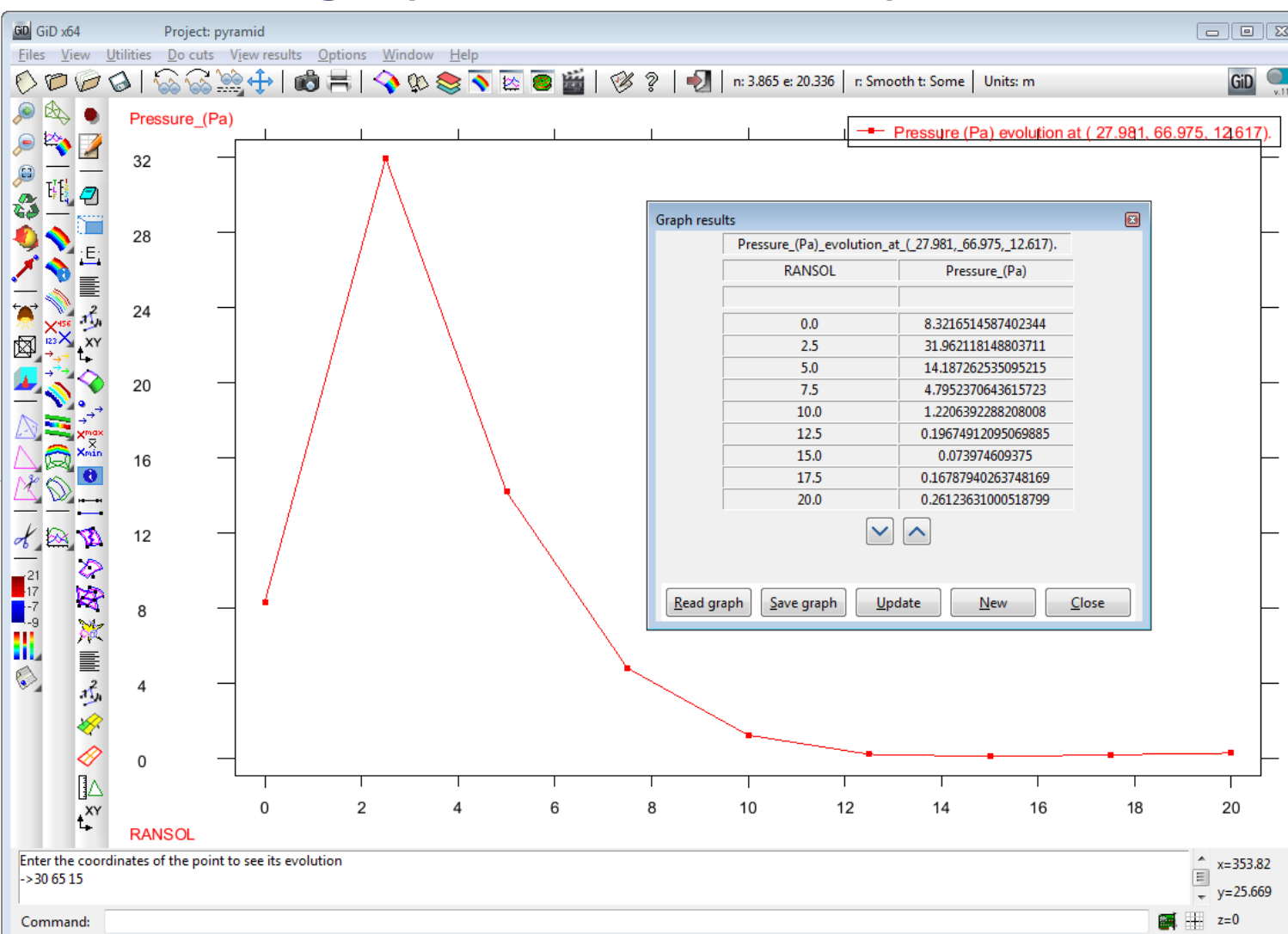
# Create graphs

- 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

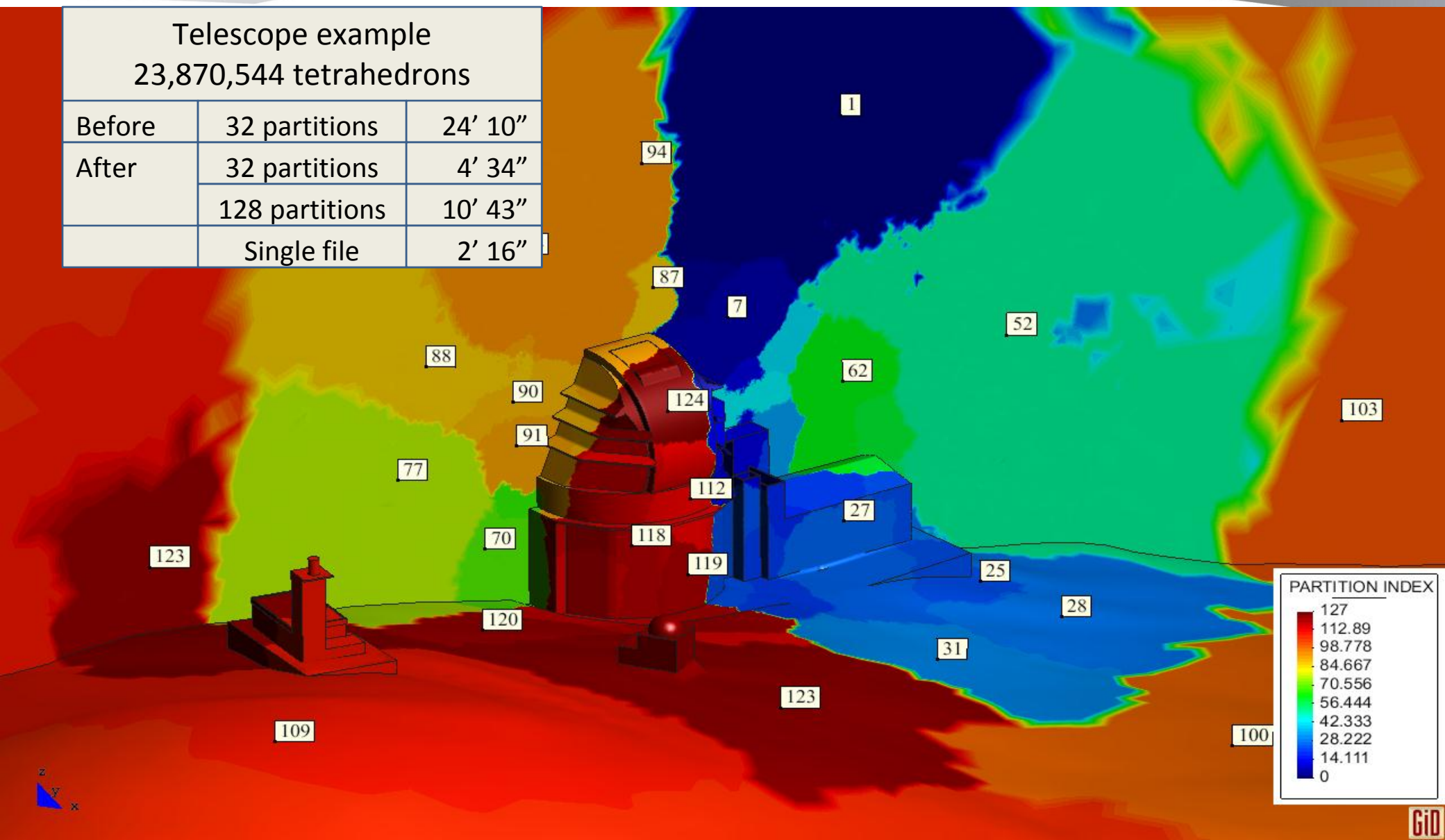


- Merge improved, by postponing any calculation:
  - Skin extraction
  - Finding boundary edges
  - Smoothed normals
  - Neighbour information
  - Graphical objects creation

# Merging many partitions

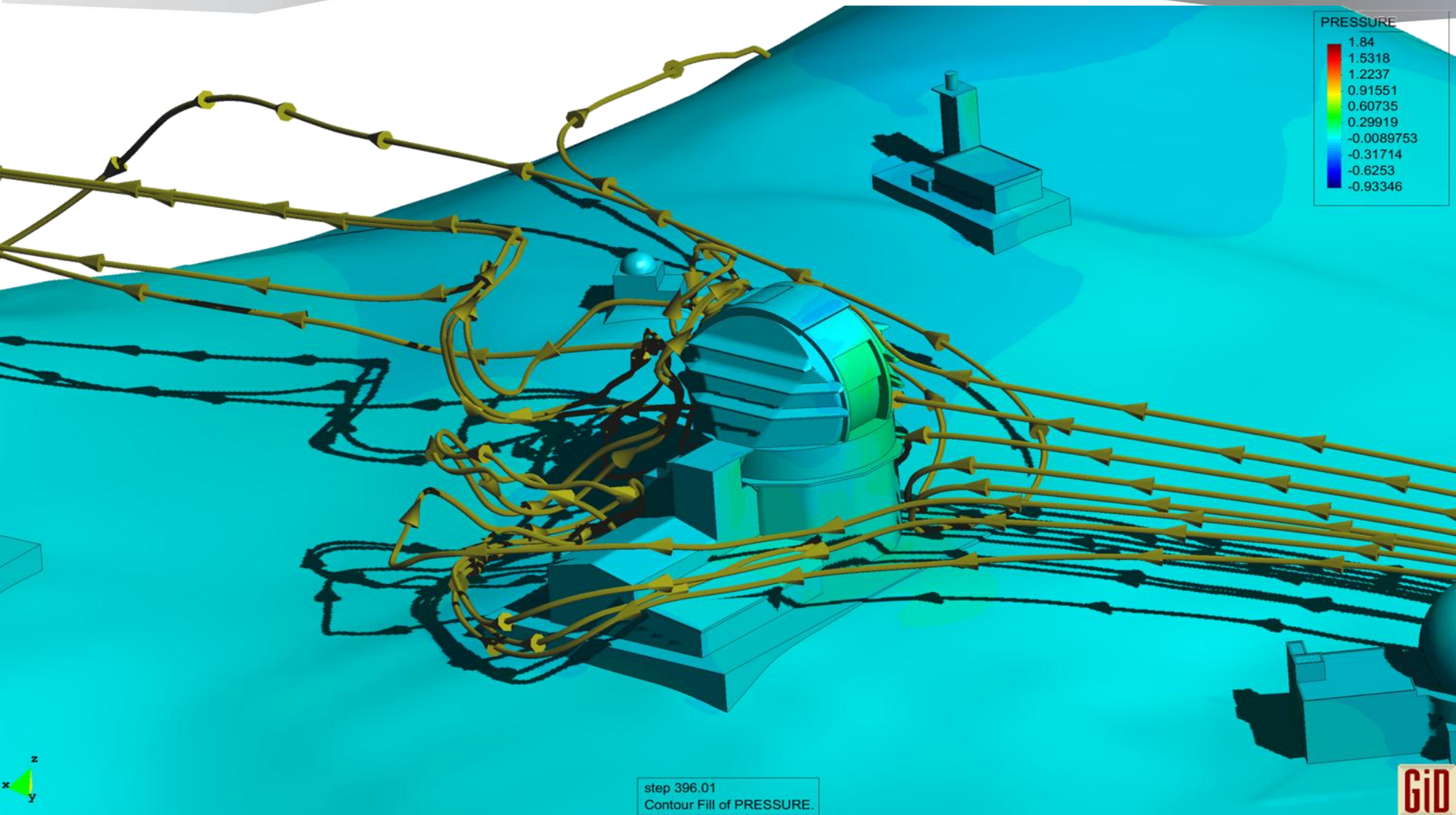
Telescope example  
23,870,544 tetrahedrons

|        |                |         |
|--------|----------------|---------|
| Before | 32 partitions  | 24' 10" |
| After  | 32 partitions  | 4' 34"  |
|        | 128 partitions | 10' 43" |
|        | Single file    | 2' 16"  |



# Merging many partitions

GiD



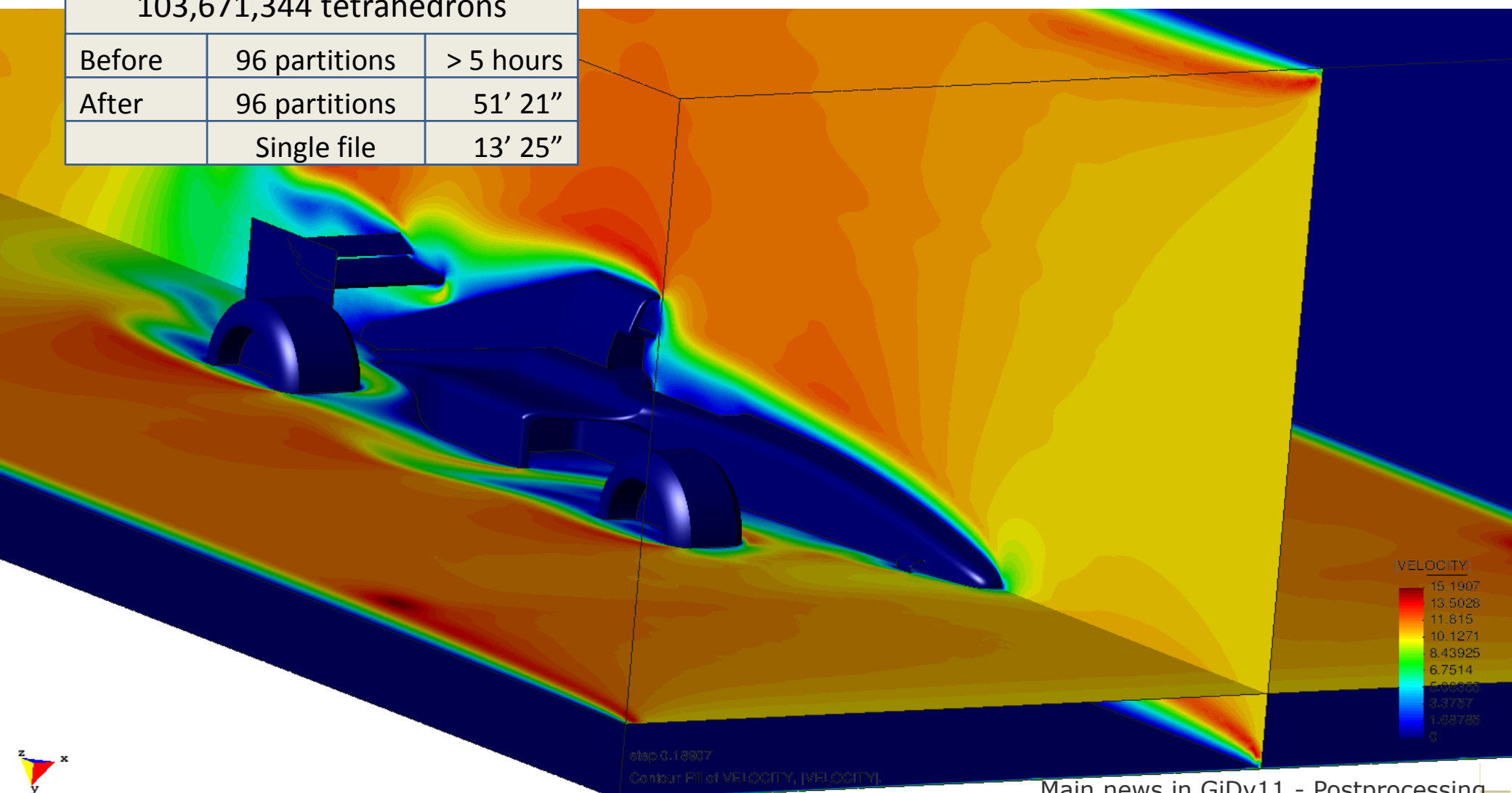


# Merging many partitions



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

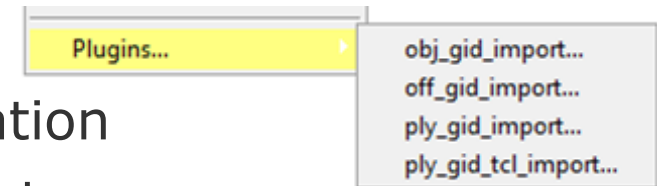
# GiD dynamic library plug-ins



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\_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-commands

**GiD\_Graph** to handle postprocess graphs.

**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 wrapper (library for scientific visualization)  
And vtk\_objarray optional package to efficiently transfer array data between vtk structures and Tcl

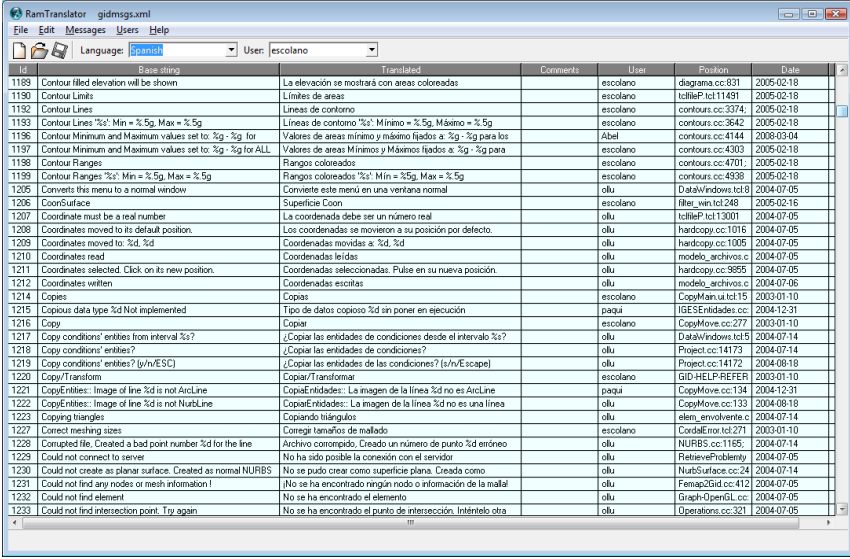


The packages are used by several import/export plug-ins

# 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



The screenshot shows the 'RamTranslator' application window with the title 'gidmsg.xml'. It features a menu bar (File, Edit, Messages, Users, Help) and a toolbar with icons for file operations and a language dropdown set to 'Spanish'. Below the toolbar is a 'User' dropdown set to 'escolano'. The main area contains a table with 8 columns: Id, Base string, Translated, Comments, User, Position, and Date. The table lists various translation entries for the application's messages.

| Id   | Base string  | Translated   | Comments | User     | Position           | Date       |
|------|--|--|----------|----------|--------------------|------------|
| 1188 | Contour filled elevation will be shown                     | La elevación se mostrará con áreas coloreadas                |          | escolano | diagrama.cc:831    | 2005-02-18 |
| 1190 | Contour Limits   | Límites de áreas   |          | escolano | tbltP.tblt11431    | 2005-02-18 |
| 1192 | Contour Lines  | Líneas de contorno   |          | escolano | contours.cc:3374   | 2005-02-18 |
| 1193 | Contour Lines "%s": Min = %5g, Max = %5g                   | Líneas de contorno "%s": Mínimo = %5g, Máximo = %5g          |          | escolano | contours.cc:3642   | 2005-02-18 |
| 1196 | Contour Minimum and Maximum values set to: %g - %g for     | Valores de áreas mínimo y máximo fijados a: %g - %g para los |          | Abel     | contours.cc:4144   | 2009-03-04 |
| 1197 | Contour Minimum and Maximum values set to: %g - %g for ALL | Valores de áreas Mínimo y Máximo fijados a: %g - %g para     |          | escolano | contours.cc:4303   | 2005-02-18 |
| 1198 | Contour Ranges   | Rangos coloreados  |          | escolano | contours.cc:4701   | 2005-02-18 |
| 1199 | Contour Ranges "%s": Min = %5g, Max = %5g                  | Rangos coloreados "%s": Mín = %5g, Max = %5g                 |          | escolano | contours.cc:4938   | 2005-02-18 |
| 1205 | Convert this menu to a normal window                       | Convierte este menú en una ventana normal                    |          | olu      | DataWindows.tblt8  | 2004-07-05 |
| 1206 | CoordSurface   | Superficie Color   |          | escolano | Riser.win.tblt248  | 2005-02-15 |
| 1207 | Coordinate must be a real number                           | La coordenada debe ser un número real                        |          | olu      | tbltP.tblt13001    | 2004-07-05 |
| 1208 | Coordinates moved to its default position.                 | Los coordenadas se movieron a su posición por defecto.       |          | olu      | hardcopy.cc:1016   | 2004-07-05 |
| 1209 | Coordinates moved to: %d, %d                               | Coordenadas movidas a: %d, %d                                |          | olu      | hardcopy.cc:1005   | 2004-07-05 |
| 1210 | Coordinates read   | Coordenadas leídas   |          | olu      | modelo_archivos.c  | 2004-07-05 |
| 1211 | Coordinates selected. Click on its new position.           | Coordenadas seleccionadas. Pulse en su nueva posición.       |          | olu      | hardcopy.cc:9555   | 2004-07-05 |
| 1212 | Coordinates written  | Coordenadas escritas   |          | olu      | modelo_archivos.c  | 2004-07-05 |
| 1214 | Copies   | Copias   |          | escolano | CopMan.tblt15      | 2003-01-10 |
| 1215 | Copious data type %d Not implemented                       | Tipo de datos copioso %d sin poner en ejecución              |          | paqui    | IGSEEntidades.cc   | 2004-12-31 |
| 1216 | Copy   | Copiar   |          | escolano | CopMove.cc:277     | 2003-01-10 |
| 1217 | Copy conditions' entities from interval %s?                | ¿Copiar las entidades de condiciones desde el intervalo %s?  |          | olu      | DataWindows.tblt5  | 2004-07-14 |
| 1218 | Copy conditions' entities?                                 | ¿Copiar las entidades de condiciones?                        |          | olu      | Project.cc:14173   | 2004-07-14 |
| 1219 | Copy conditions' entities? (%v/E/S/C)                      | ¿Copiar las entidades de las condiciones? (%v/E/S/C)         |          | olu      | Project.cc:14172   | 2004-09-18 |
| 1220 | Copy/Transform   | Copiar/Transformar   |          | escolano | GiD-HELP-REFER     | 2003-01-10 |
| 1221 | CopyEntities: Image of line %d is not ArcLine              | CopiarEntidades: La imagen de la línea %d no es ArcLine      |          | paqui    | CopMove.cc:134     | 2004-12-31 |
| 1222 | CopyEntities: Image of line %d is not NurbsLine            | CopiarEntidades: La imagen de la línea %d no es una línea    |          | olu      | CopMove.cc:133     | 2004-08-18 |
| 1223 | Copping triangles  | Copiar triángulos  |          | olu      | elem_envolvente.c  | 2004-07-14 |
| 1227 | Correct meshing sizes                                      | Corregir tamaños de malla                                    |          | escolano | CoordEnt.tblt271   | 2003-01-10 |
| 1228 | Corrupted file. Created a bad point number %d for the line | Archivo corrompido. Creado un número de punto %d erróneo     |          | olu      | NURBS.cc:1165      | 2004-07-14 |
| 1229 | Could not connect to server                                | No ha sido posible la conexión con el servidor               |          | olu      | RetrieveProblem.c  | 2004-07-05 |
| 1230 | Could not create a planar surface. Created as normal NURBS | No se pudo crear como superficie plana. Creada como          |          | olu      | NurbsSurface.cc:24 | 2004-07-14 |
| 1231 | Could not find any nodes or mesh information!              | ¡No se ha encontrado ningún nodo o información de la malla!  |          | olu      | Femap2Gid.cc:412   | 2004-07-05 |
| 1232 | Could not find element                                     | No se ha encontrado el elemento                              |          | olu      | Graph-OpenGL.cc    | 2004-07-05 |
| 1233 | Could not find intersection point. Try again               | No se ha encontrado el punto de intersección. Inténtelo otra |          | olu      | Operations.cc:321  | 2004-07-05 |

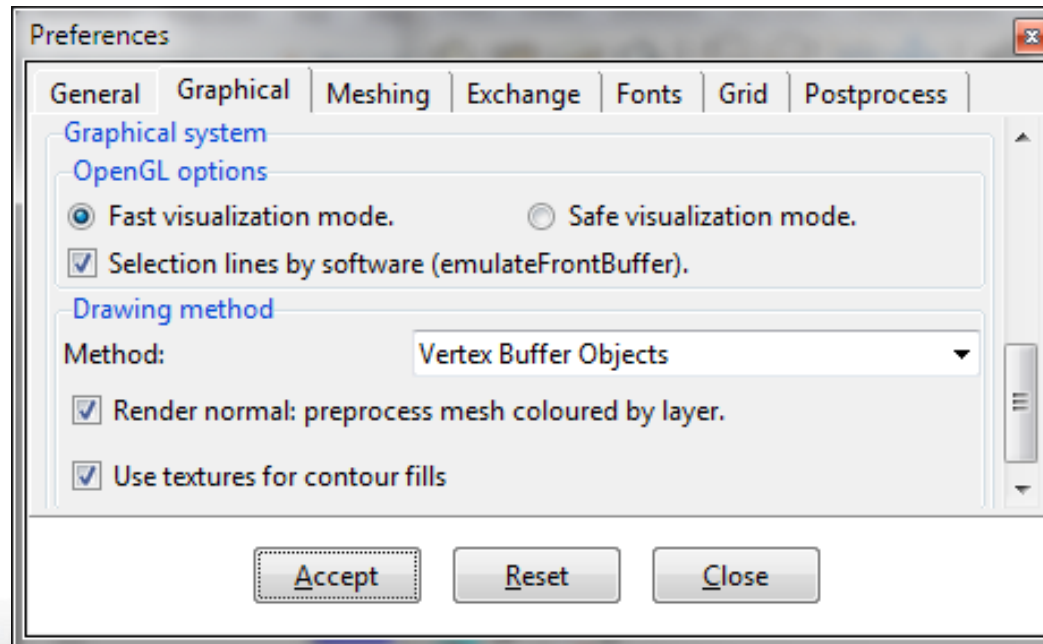
Tktable widget used in Ramtranslator



# Faster visualization



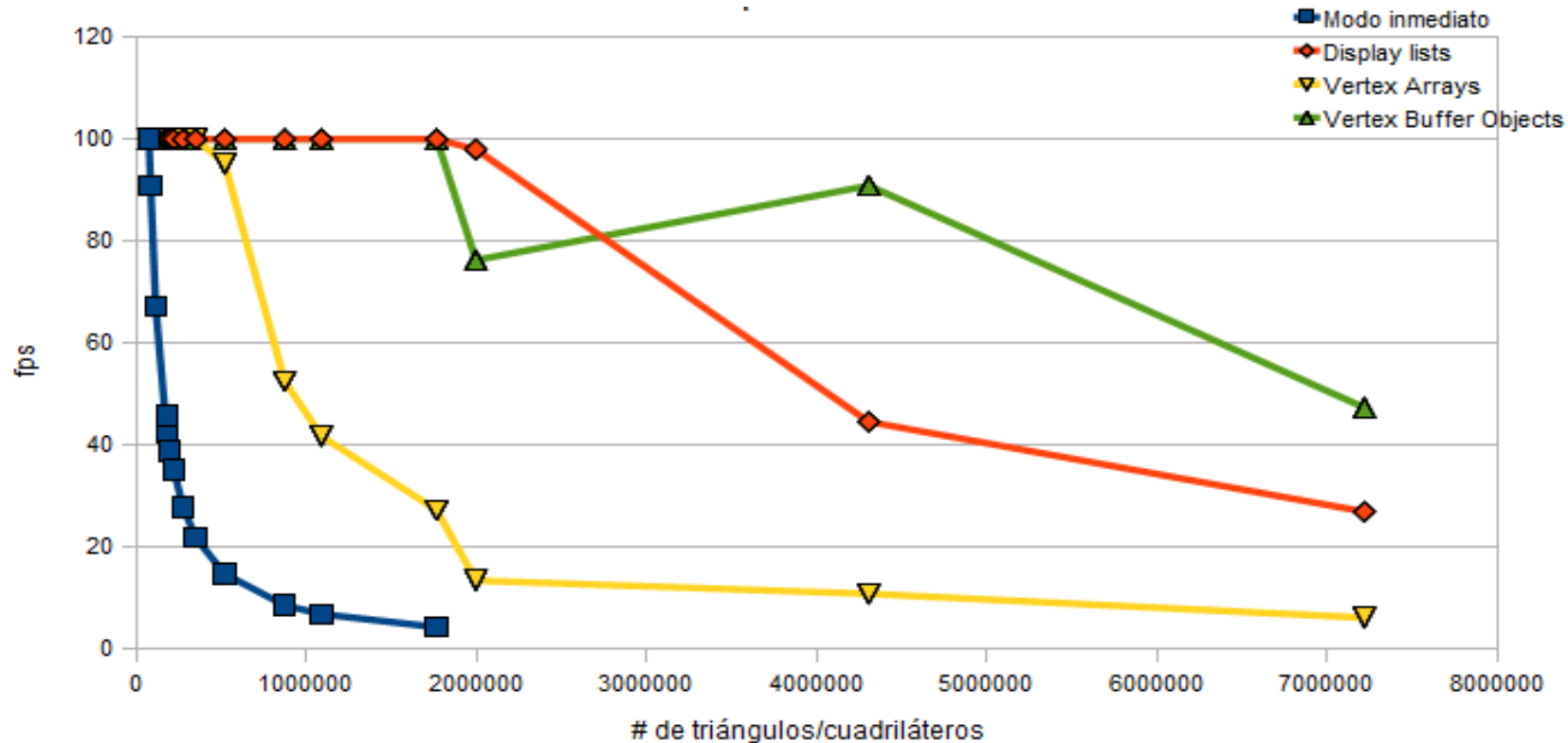
- OpenGL techniques:
  - Display lists: compiled list of commands, stored in graphics memory
  - Vertex arrays: compact data, fewer calls
  - Buffer objects: arrays stored in graphics memory
  - Textures for contour fills, etc.



# Faster visualization



- Useful with graphics hardware

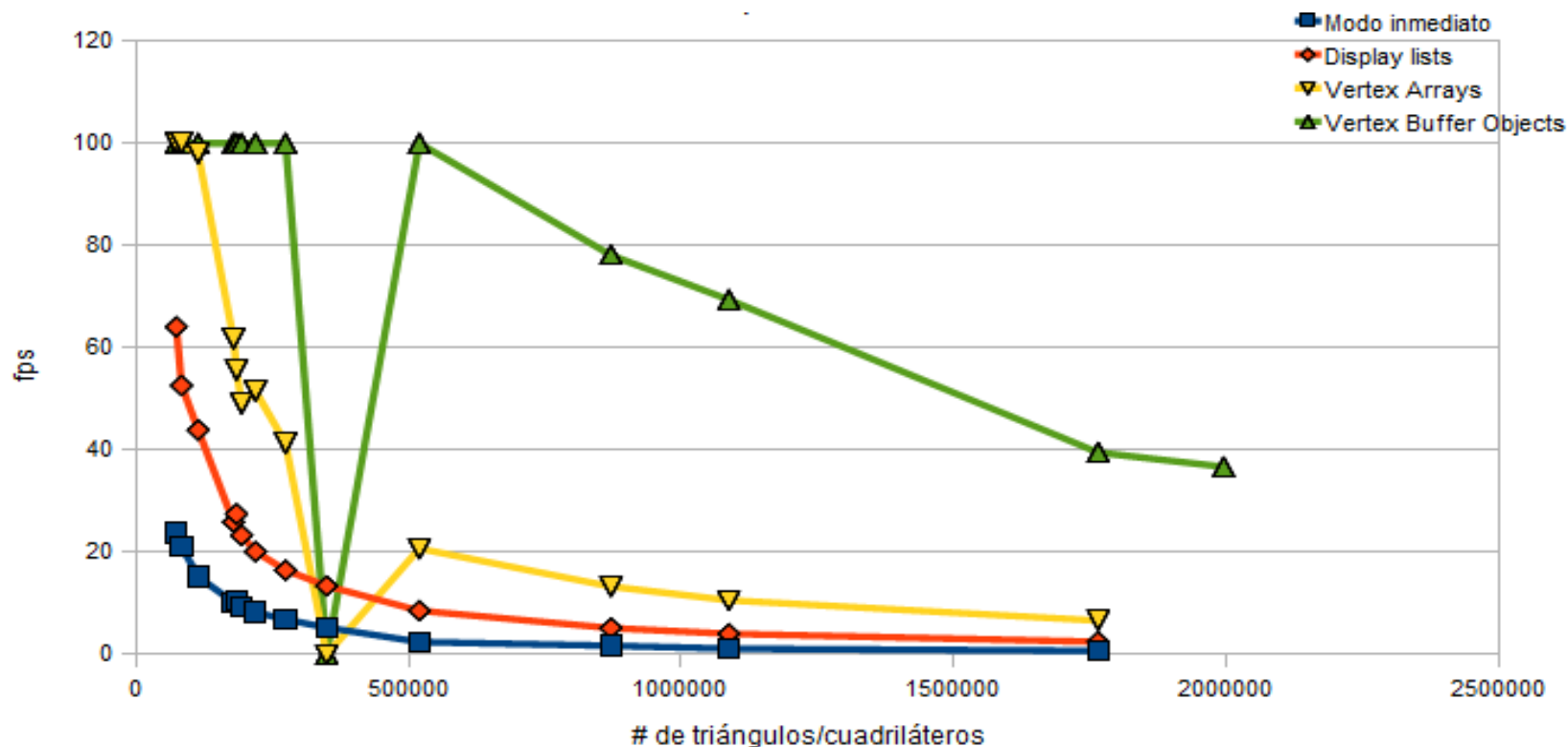


Intel QuadCore Q9550 + NVIDIA GTX 275 ( 896MB)

# Faster visualization

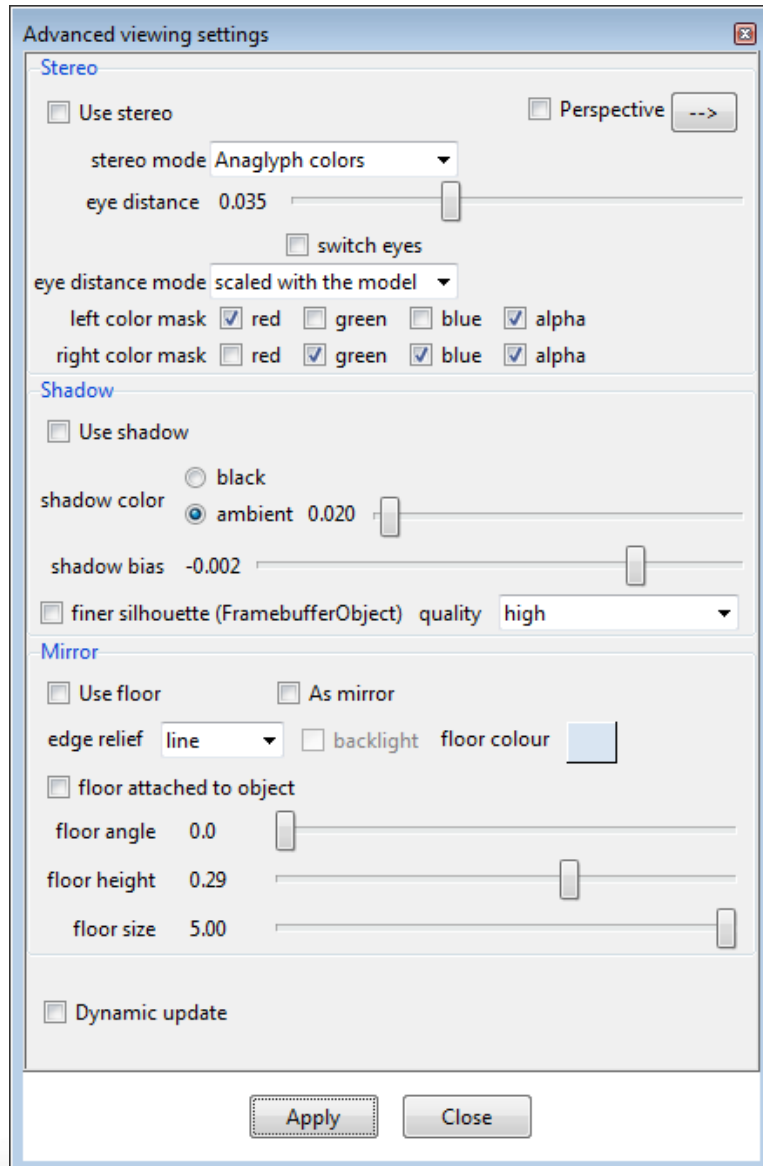


- Useful with modest graphics hardware



Intel QuadCore Q9550 + Intel G45 ( shared memory)

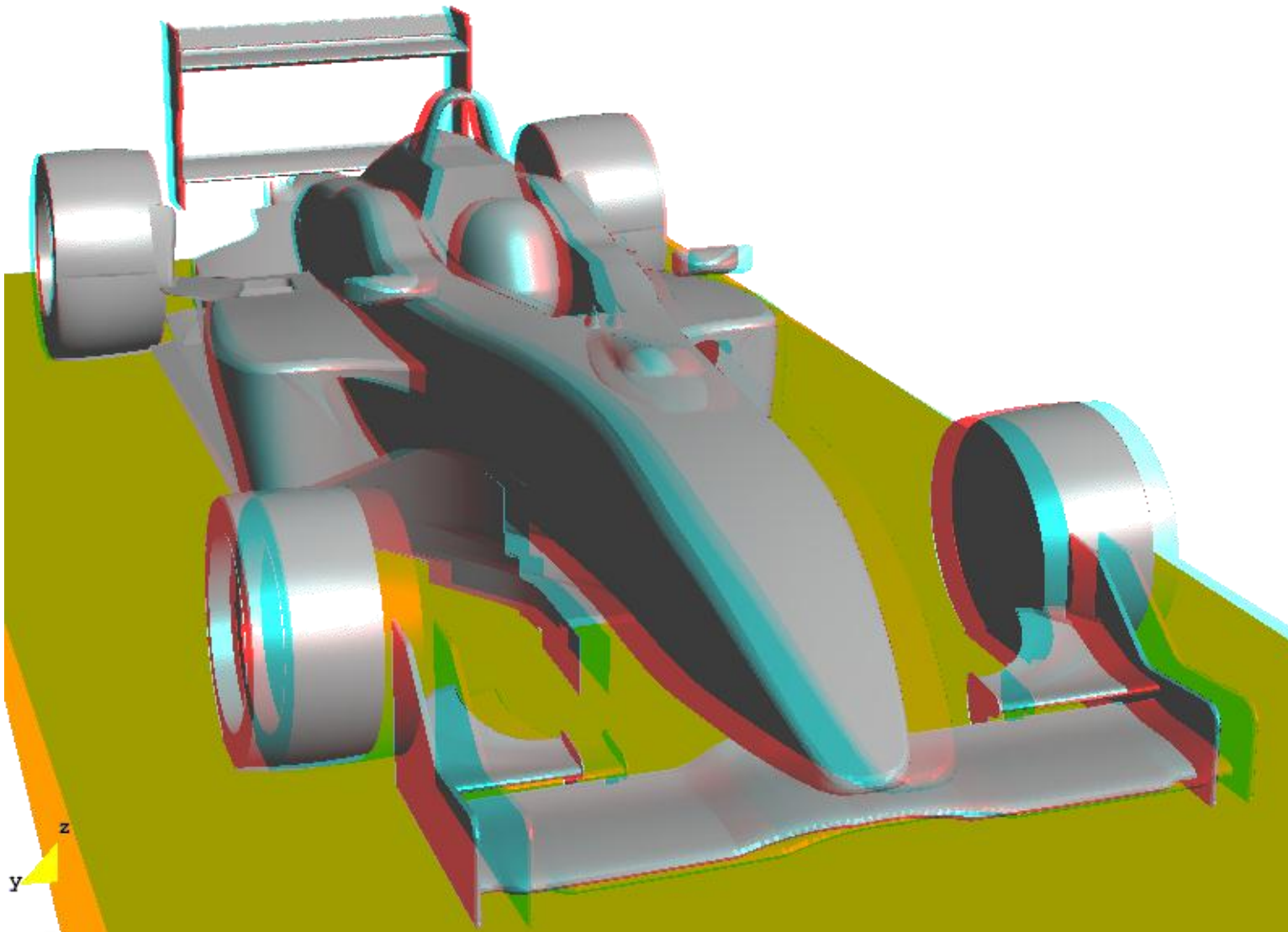
# Advanced viewing settings



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

# Stereoscopy

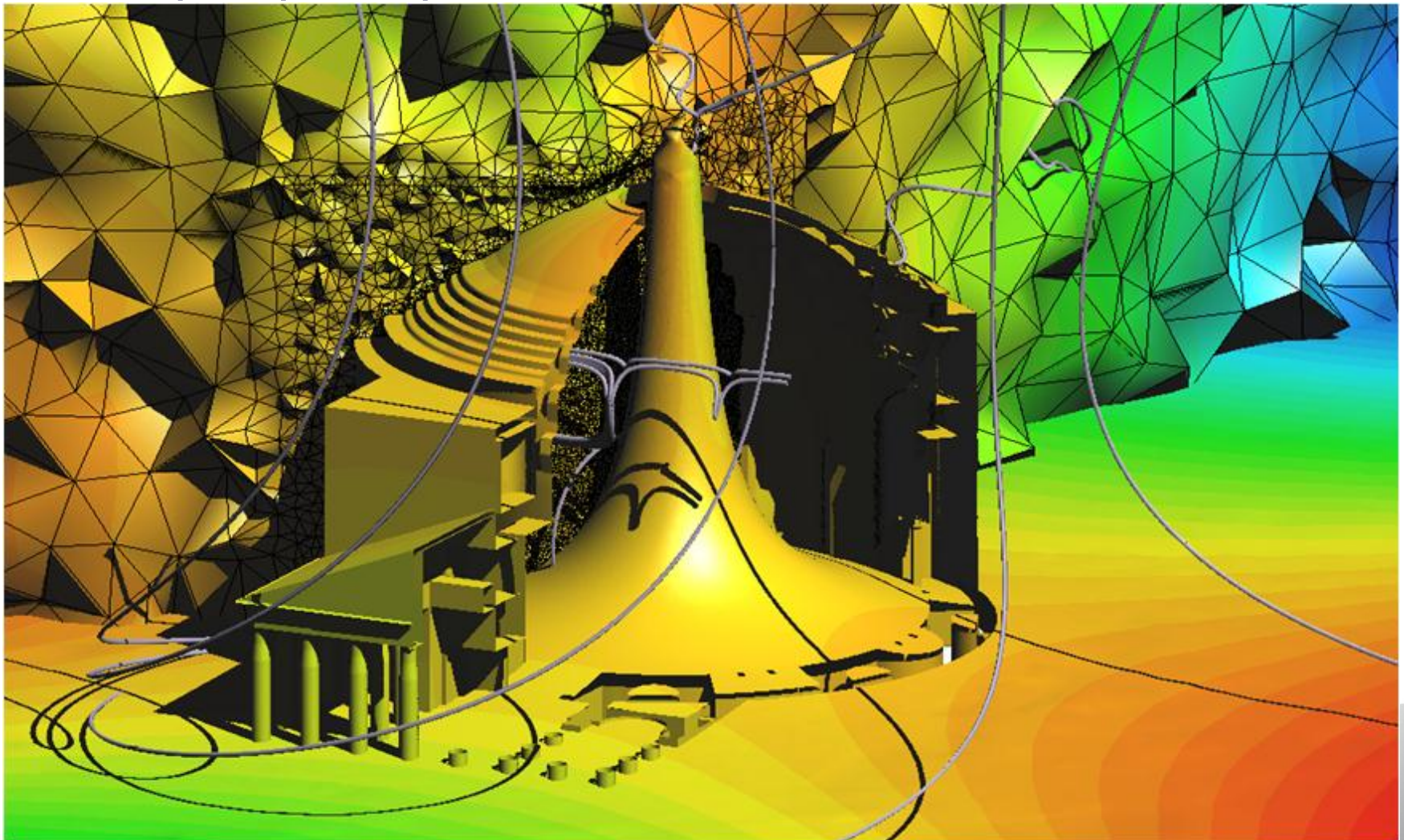
GiD





# Shadows

Better depth perception

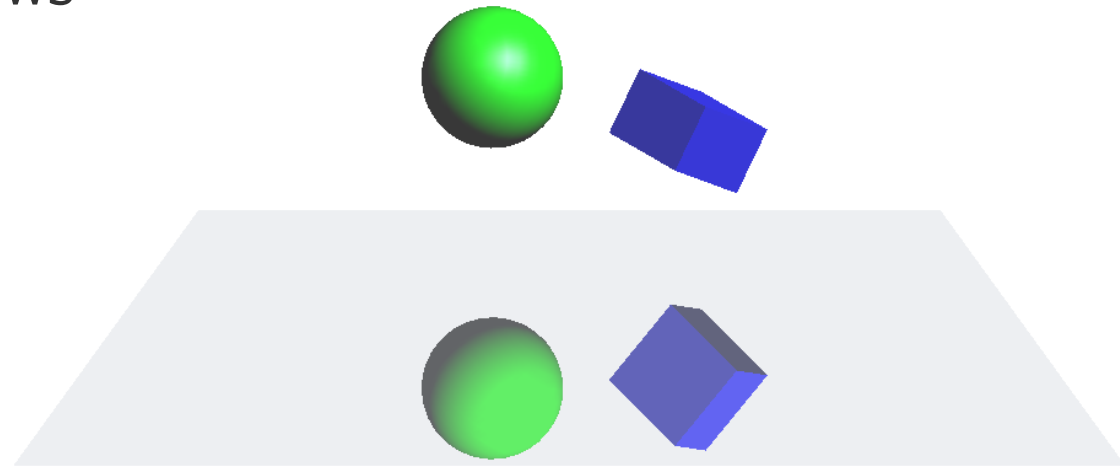
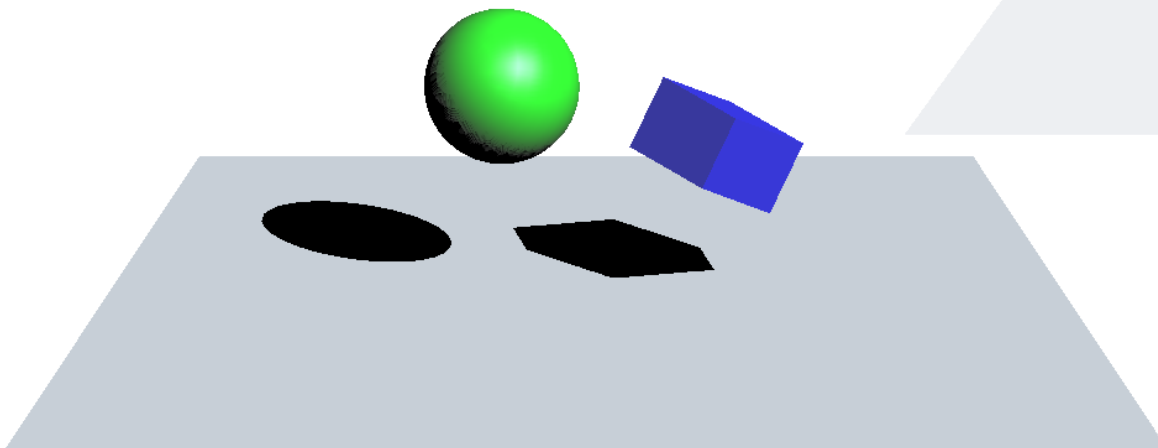




# Ground plane



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



# Batch post-processing: off-screen

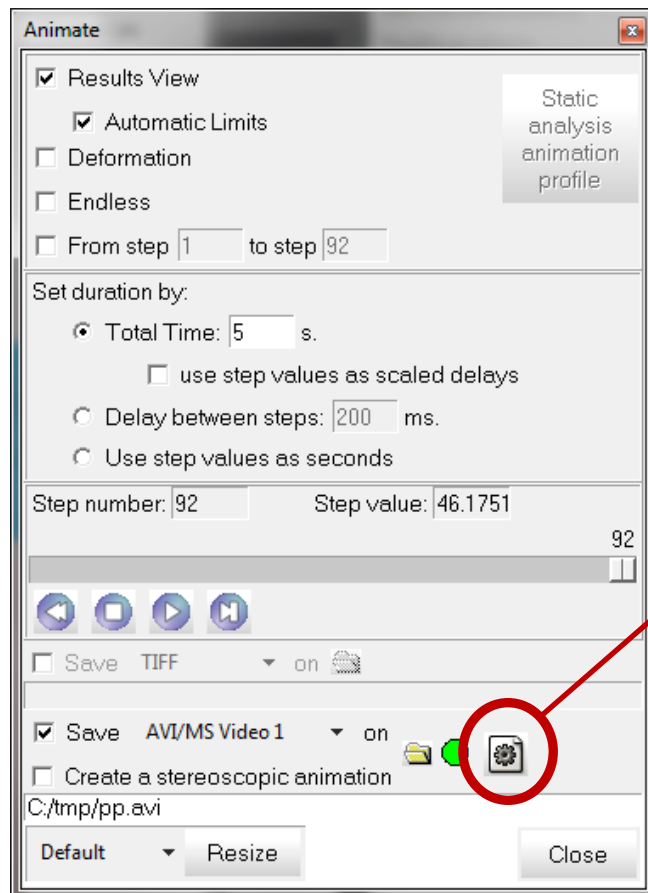


- GiD with no interaction and no window
- Command line:  
`gid -offscreen [ WxH] -b+g batch_file_to_run`
- Useful to:
  - launch costly animations in bg or in queue
  - use gid as template generator
  - use gid behind a web server: Flash Video animation
- Animation window: added button to generate batch file for offscreen-gid to be sent to a batch queue.

# Batch post-processing: off-screen

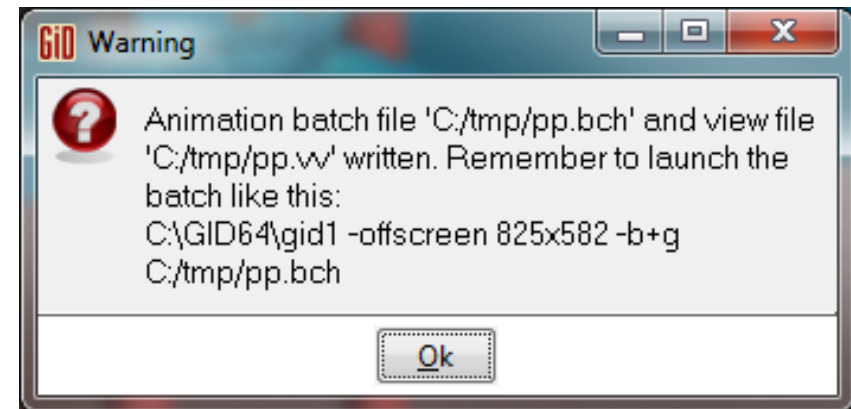


- Animation window: added button to generate batch for offscreen-gid



generates:

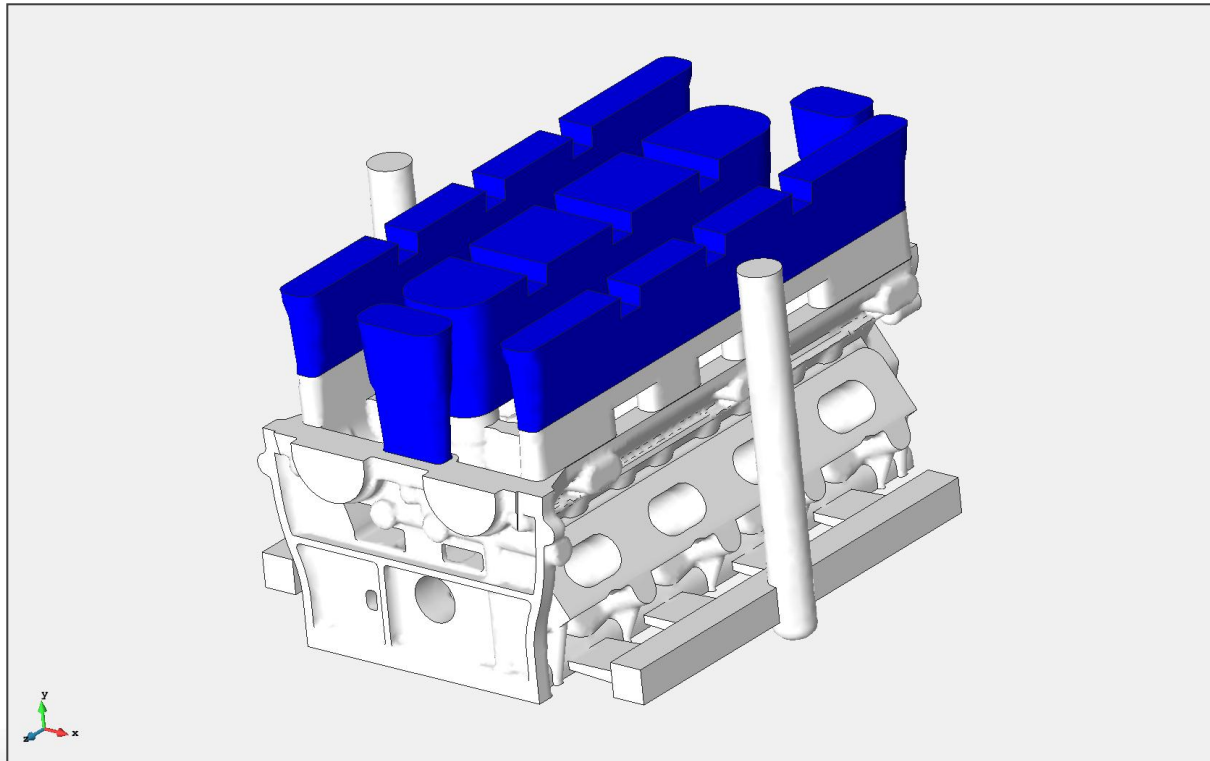
.bch - Batch to create animation file  
.vv - view file storing current view



# More incorporations



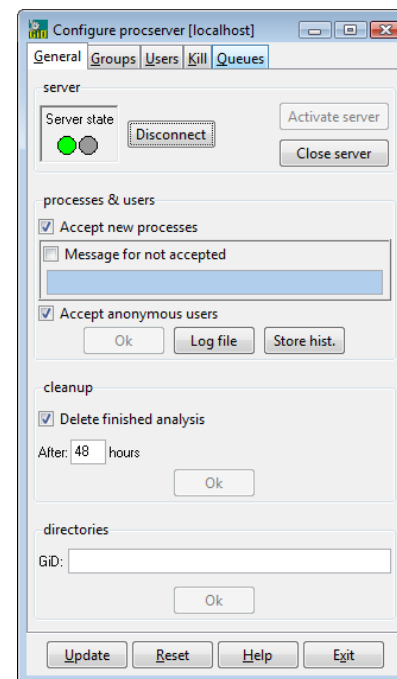
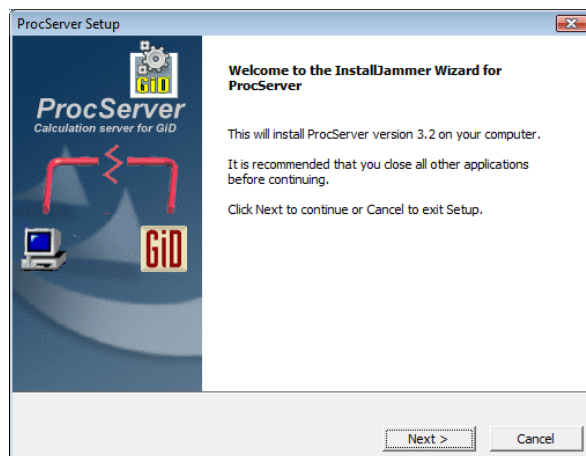
- Animation: new Macromedia Flash Video (.flv) format
- PDF output: now outputs images in .pdf format
- Dual monitor support
- Full-screen mode ( F11):



# 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)

