Griddle™ VERSION 2.0

Advanced Meshing Tools for Numerical Modeling

ABOUT *Griddle*

Griddle offers engineers and scientists powerful and easy-to-use mesh generation capabilities that cover a wide range of volume mesh generation needs as well as operations with surface meshes. *Griddle* is a plug-in for Rhinoceros 3D CAD system that provides new tools and extends native Rhino capabilities.

Griddle includes powerful tools for surface-mesh intersection, remeshing with customizable parameters, and an efficient volume mesher that generates unstructured tetrahedral or hexahedral-dominant volume meshes. *Griddle* also creates structured hexahedral volume meshes from Rhino solids via the *BlockRanger* tool. *Griddle* surface mesh tools include mesh repair, extraction, expansion, and extrusion. Volume meshes can be exported as *FLAC3D* and *3DEC* grids; other modeling formats are supported (ABAQUS, ANSYS, NASTRAN, LS-DYNA, VRML, and CSV).

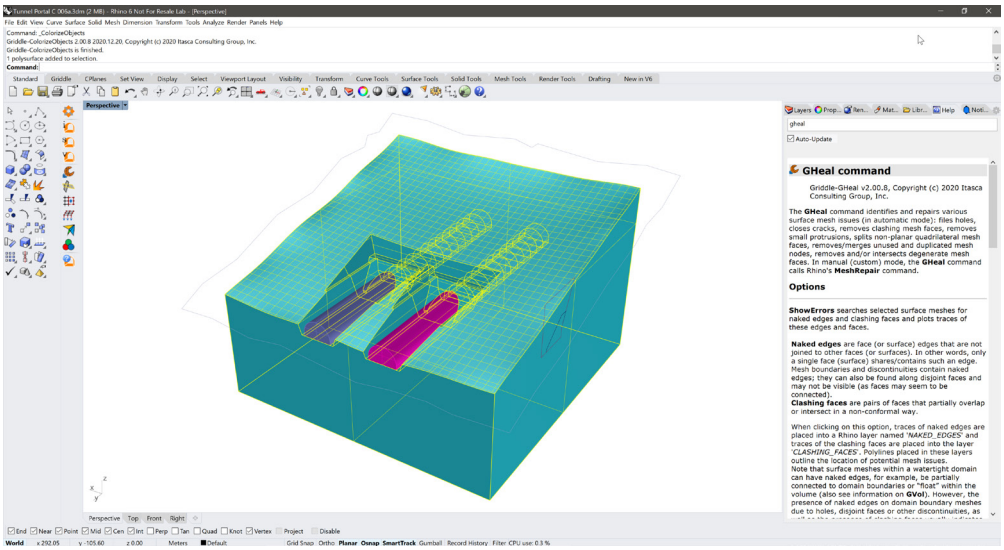
FEATURES

RHINO 3D CAD PLUG-IN

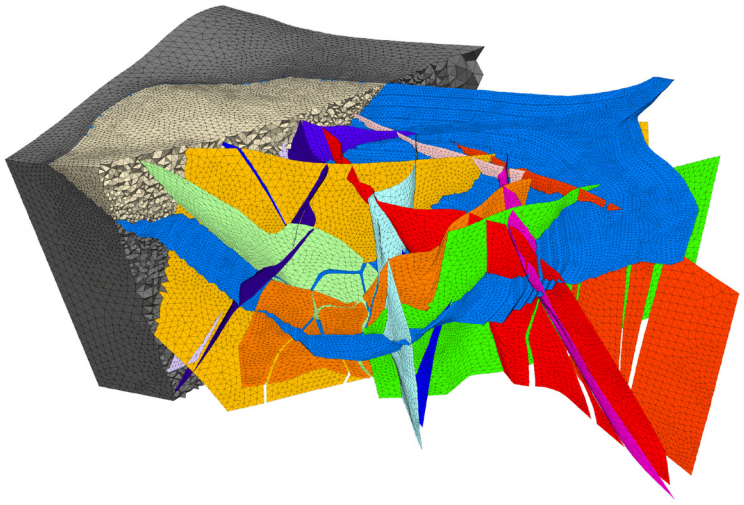
- *Griddle* leverages and extends the capabilities of Rhino[1,2] software
- Rhino can create, edit, analyze, document, render, animate, and translate curves, surfaces, solids, point clouds, and polygon meshes
- Powerful, accurate, and free-form 3D modeling tools
- Model any shape you can imagine
- Affordable with no maintenance fees
- Fast, even on standard laptop computers
- Short learning curve with extensive documentation and step-by-step tutorials
- Compatible with most design, drafting, CAM, engineering, analysis, rendering, animation, and illustration software
- Customize, parameterize, and automate Rhino and *Griddle* using powerful Visual Basic, Python scripting, and Grasshopper (a graphical algorithm editor)
- New formats for *3DEC*, *FLAC3D*, and CSV output **NEW**
- Engine is faster and more robust **NEW**

GINT TOOL

- Powerful mesh intersector to create conformal (node-to-node) triangular mesh from any number of selected, intersecting meshes
- Requires only a single tolerance input
- Separate/merge intersected meshes **NEW**
- Separate intersected faces from other meshes to ease additional operations **NEW**



▲ Rhino model of two tunnel portals designed using surface extrusion, meshing, and non-manifold merge tools. Griddle was used to remesh the surfaces and export a *FLAC3D* volume mesh with named groups.



▲ *FLAC3D* model of a large open pit mine with multiple intersecting faults that was generated using *Griddle*. All the faults are conformal to each other and the open pit surface.

[1]*Griddle* 1.0 works with Rhinoceros 5.0. *Griddle* 2.0 requires Rhinoceros 6.0 or 7.0 software. [2]Rhinoceros software is sold separately. Itasca is an official Rhinoceros distributor.

GSURF TOOL

- Advanced remeshing of any Rhino mesh
- Output meshes can be triangle, quad-dominant (triangles and quadrilaterals), or all quadrilaterals
- Specify the minimum and maximum edge lengths as well as the ridge angle which controls the level of mesh detail
- Automatically retain/delete original mesh
- Specify hard edges and nodes that will be preserved in a mesh during the remeshing process
- Separate/merge remeshed meshes NEW
- More meshing controls (gradation, quadrilateral weight, element shape quality, and optimization level) NEW
- Specify local mesh size via URL field to preserve mesh names (name field) NEW
- Improved logic for hard edges/nodes for better control of local element sizes NEW

GVOL TOOL

- Unstructured volume mesher for generation of tetrahedral or hexahedral-dominant meshes using selected surface meshes as boundaries
- "Floating" surface meshes inside a volume (e.g., discontinuous geological joints) can be included as "hard faces" in the final volume mesh
- Surface mesh names are preserved and used as face/joint group names within volume mesh (only for *FLAC3D*, *3DEC*, CSV outputs)
- Automatic checks for surface mesh problems before meshing NEW
- More meshing controls (element target size, element shape quality, size gradation, and optimization level) NEW

BLOCKRANGER

- Create structured hexahedral meshes for strict control of element quality, spatial distribution, and orientation
- Interactively create/partition an assembly of solids consisting of tetrahedrons, prisms, and hexahedrons
- Maintain grid conformity/continuity across block corners, edges, and faces for contiguous solids
- More robust engine to handle concave surfaces and improperly connected solid nodes/edges NEW
- Automatically create boundary surface meshes based on meshed solids NEW

GEXTRACT TOOL

- Extract surface mesh faces or sub-meshes based on various criteria/an initial seed
- "Explode" meshes into sub-meshes based on a break angle and non-manifold edges NEW
- Extract faces attached to boundary or non-manifold edges NEW
- Extract sub-meshes located within a specified solid NEW

GHEAL TOOL NEW

- A utility that can be used to identify certain surface mesh problems and fix them automatically or manually
- Can help with patching mesh holes or boundary cracks, clean clashing faces and small protrusions, split non-planar quadrilateral faces, align mesh normals, and clean redundant nodes and detached faces

GEXTEND TOOL NEW

- Extends a surface mesh along a specified part of a boundary by adding new faces
- Different extension modes including free-form extension
- Useful for:
  - Extending fault meshes that do not completely intersect with other faults or surfaces (stopes, pit walls, etc.)
  - Creation of *3DEC* blocks and joints by extending floating joints

GEXTRUDE TOOL NEW

- Quickly extrude a surface mesh to create a watertight modeling domain (with any orientation)
- Create a structured or unstructured surface mesh
- Merge or separate extruded elements

*GRIDDLE*ABOUT NEW

- Easily access information about the current version, license key information, and update notifications

AND MORE

- The **NonManifoldMerge** Rhino shortcut quickly combines selected manifold or non-manifold surfaces or polysurfaces into a single non-manifold polysurface
- The **ColorizeObjects** tool assigns different (random) colors to each selected object to better disambiguate them
- Easy, fully automatic installer and automatic update checking NEW
- Revised Rhino Help documentation
- Improved file naming and project management NEW
- Revised User Manual and Tutorials NEW

BENEFITS

- General-purpose interactive mesh generator with applications from fluids and geomechanics to structures and biomedical models
- Easy to learn and to use. If you know Rhino, you already know how to use *Griddle*
- *Griddle* and *BlockRanger* volume meshes can be imported directly into *FLAC3D* and *3DEC*, and into many other numerical modeling software packages
- Mesh discontinuities are automatically defined as joints in *3DEC* and can be easily specified as interfaces in *FLAC3D*

TRY THE DEMO

Itasca is pleased to offer free demo versions of all software for download. There is no restriction to the length of time you can use the demos, but mesh size restrictions apply.

www.itascacg.com/demos

ORDER SOFTWARE

Itasca sales offices and agents vary geographically. To locate or contact the agent for your region, visit:

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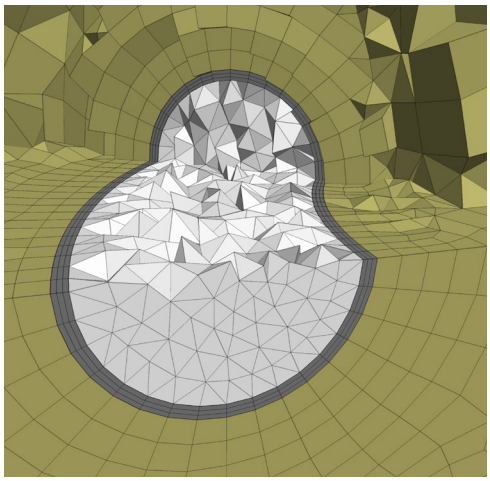
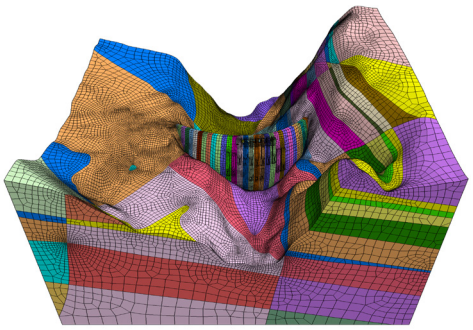
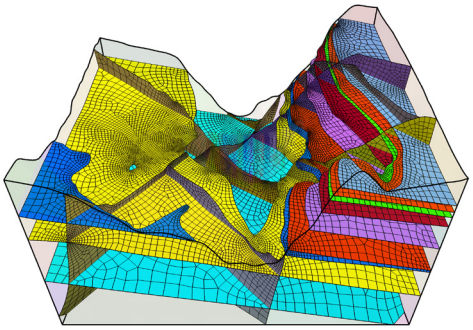


▲ *Griddle* is very versatile as shown by this *FLAC3D* model of a curved circular tunnel. The core is a tetrahedral mesh surrounded by a liner using a high-quality hexahedral mesh. The rest of the model is a hexahedral-dominant unstructured mesh.





▲ *Griddle* was used to create a complex mesh for a hydroelectric power dam. The topology and dam (top) along with the major faults and bedding (bottom) of the resulting *FLAC3D* model are shown.