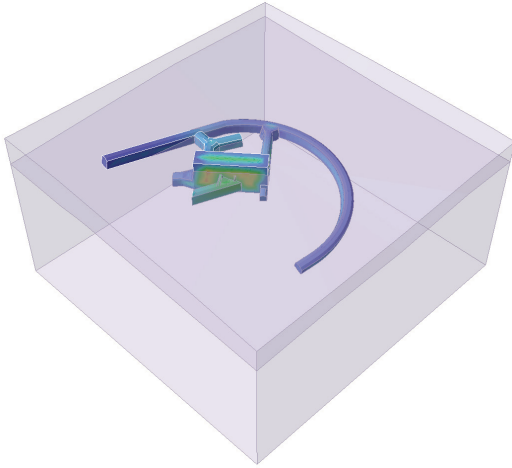# RS3
3D Geotechnical Finite Element Analysis

Underground mining in RS3

What is RS3?

RS3 is designed for 3D analysis of geotechnical structures for civil and mining applications. Applicable for both rock and soil, RS3 is a general-purpose finite element analysis program for underground excavations, surface excavation, tunnel and support design, foundation design, embankments, consolidation, groundwater seepage, and more.

RS3 offers complete flexibility for staging of excavations, support installation, loading, and all other modeling aspects. Models with up to several hundred different stages can be analyzed with RS3.

What's New in RS3

Improved Built-in Geometry Tools

- With built-in geometry tools in RS3, problems with imported geometry can be fixed quickly. RS3 includes a number of powerful new advanced built-in geometry tools:
    - Geometry clean-up
    - Surface remeshing and merging of intersecting surfaces
    - Project-wide geometry settings

New Structural Liner Interfaces

- Liners are 2D support elements that can be used to define excavation support systems such as shotcrete, geosynthetics, concrete, piles, and bolts.

  While previous versions of RS3 assumed the interface behaviour to be the same as that of the liner, users can now model and analyze the interactive behaviour between a liner and the excavation material or another liner. This results in more realistic support modeling.

RS2 Section Creator

- RS3 can now create 2D sections of a 3D model for analysis and viewing in RS2. Once it is created in the Section Creator, the file can be saved in RS2, where it can then be meshed and a 2D finite element analysis can be computed.

3D Tunnel Designer

- The 3D Tunnel Designer expands on RS3's existing Tunnel Profiler. The new Tunnel Designer will allow for focusing on the model itself instead of on time-consuming sequencing tasks. In addition, the Tunnel Designer allows multiple users to collaborate by saving tunnel profiles for re-use by other engineers in other RS3 projects.

Find more details: rocscience.com/software/rs3

Plans & Pricing

Personal License: Locked to one computer.

- Lease: **USD $6,195/year**
  Leased annually. Includes Maintenance+.
- Perpetual: **USD $12,995**
  Purchased outright. Includes 12 months of Maintenance+.

Flexible License: Installed on any number of machines. The license file sits on the server.

- Lease: **USD $8,245/year**
  Leased annually. Includes Maintenance+.
- Perpetual: **USD $18,995**
  Purchased outright. Includes 12 months of Maintenance+.

Maintenance+

Maintenance+ is our enhanced maintenance and support services subscription, purchased annually at 20% of the license cost.

With Maintenance+ Continuous Software you get access to all feature releases, enhancements, and bug fixes throughout the year and as soon as they're available. You also have access to convenient License Services, the support of our experts, and exclusive learning offerings.

Contact us at **software@rocscience.com**

Compute

- Parallel 64-bit processing
- Fully optimized
- Direct or iterative solver
- Coupled stress/pore pressure using Biot theory

Data Interpretation

- 2D/3D view
- Plot contours on horizontal, vertical, or arbitrary planes
- Plot contours on boundaries
- View stress, displacement contours
- Effective stress, pore pressure contours
- Contour user-defined data
- Deformation vectors
- Groundwater discharge vectors
- Display deformations to user-defined scale
- Query and graph material, support data
- Show values directly on model
- Highlight yielded material and support elements
- Display iso-surfaces
- Data tips for any object
- Annotation and dimensioning tool kit
- Export to Excel
- Export image files

Far-Field Stress

- Constant stress field
- Gravity stress field
- Stress field per material

Finite Element Slope Stability

- Automated FE slope stability using shear strength reduction (SSR) method
- Define SSR include/exclude area
- Documentation including verification models and tutorials

Groundwater

- 3D finite element seepage analysis
- Steady state or transient
- Staged groundwater
- Material permeability functions
- Discharge sections
- Piezometric lines
- Pore pressure point set
- Coupled/uncoupled analysis
- Add water surface by location
- Add pore water pressure point set by location

Loads

- Point load
- Line load
- Distributed load
- Ponded water load
- Staged loading
- Springs
- Seismic loading
- Dynamic analysis

Materials

- Soil or rock
- Elastic or plastic
- Multiple materials
- Mohr-Coulomb, Hoek-Brown, Drucker-Prager, Generalized Hoek-Brown, Cam-Clay, Modified Cam-Clay, Discrete Functions, Mohr-Coulomb with Cap material models
- Softening hardening model
- Staged material properties
- Datum-dependent properties
- Import from RocData
- Linear isotropic, transversely isotropic, orthotropic, Duncan-Chang Hyperbolic, non-linear isotropic, custom
- User-defined material models library, including ChSoil, CySoil, Hardening Soil, and Hardening Soil with Small Strain Stiffness

Meshing

- 3D tetrahedral mesh
- 4–noded or 10–noded elements
- One-click mesh generation
- Graded meshing
- Uniform meshing
- Check/Define mesh quality
- Define mesh refinement region

Modeling

- Create 3D models with CAD tools
- Multiple excavations
- Interactive geometry entry
- Vertex/Object snapping
- One-click material assignment
- Import 3D .dxf, .dwg, .obj, .stl, .step, .iges, .tin, .asc, .xyz files
- Import from Examine
- Export planar section to RS2, Slide2
- Right-click editing shortcuts
- Interactive sidebar
- Interactive staging timeline
- Tunnel profile tool
- Define soil profile with boreholes

Support

- Bolts
- Liners
- Beams
- Forepoles/Piles
- Staged support installation
- Bolt types—end anchored, fully bonded, cable bolts, Swellex, splitset, tiebacks
- Composite liners with interface elements
- Elastic or plastic
- Peak/Residual strength