



RS² version 9.0

2D Finite Element Analysis for Rock & Soil



WHAT IS RS²?

RS² is an extremely versatile 2D finite element stress analysis program for designing underground or surface excavations and their support systems. RS² (Phase² 9.0) can be used for rock or soil applications and includes **slope stability analysis**, **fully-coupled groundwater** and **dynamic analysis** capabilities.

WHY CHOOSE RS²?

- **Coupled and uncoupled** solid-fluid analysis
- **Total and effective** stress analysis
- Fully automated **Shear Strength Reduction**
- Robust **meshing capabilities** and ability to define mesh refinement areas
- Time dependent **soil consolidation and settlement** analysis
- **Dynamic analysis** capabilities
- Finite element **seepage analysis**
- Define **joint networks**
- **Probabilistic Analysis**
- **Easy-to-use, and quickly learned** without substantial time investment

PRICES & LICENSING

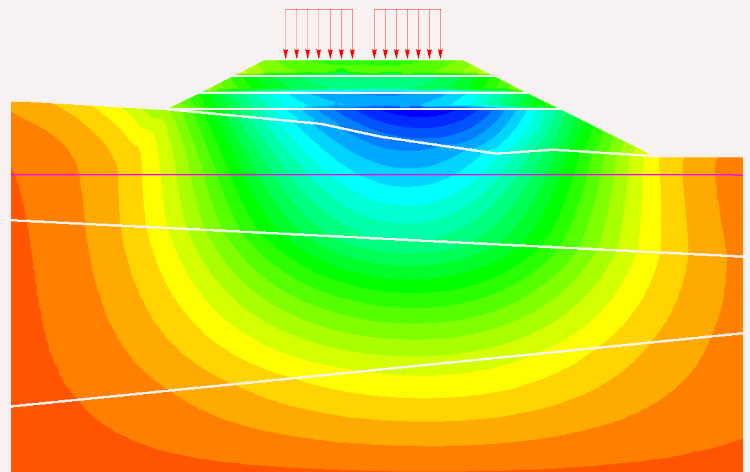
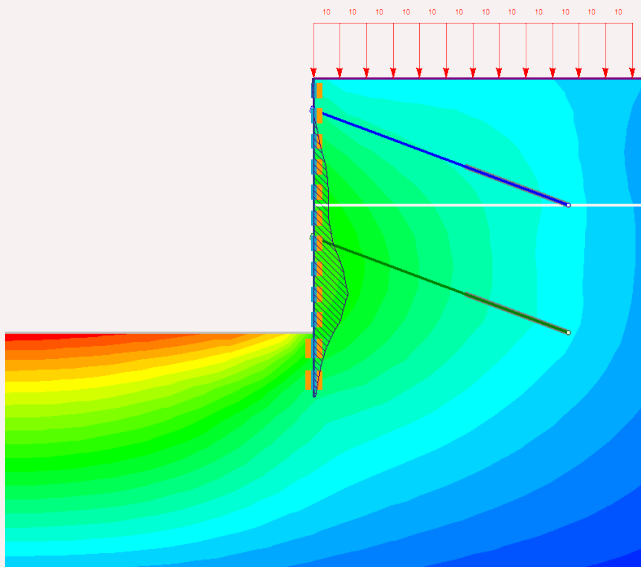
Personal License: Locked to one computer.

- Personal Perpetual: **USD \$4995**
Purchased outright.
- Personal Lease: **USD \$2495/year**
Leased annually. Includes maintenance and upgrades.

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

- Flexible Perpetual: **USD \$7995**
Purchased outright.
- Flexible Lease: **USD \$4995/year**
Leased annually. Includes maintenance and upgrades.

Maintenance can be purchased annually for our Perpetual Licenses at 15% of the license cost. With Annual Maintenance you will receive free upgrades and technical support. Contact us at software@rocscience.com!



Technical Specifications

Modeling

- interactive geometry entry
- intuitive workflow tabs
- boundaries – external, material, excavation, stage, joint, piezo, structural interface
- grid/vertex/object snapping
- sequential staging of excavation and support (up to 300 stages)
- plane strain or axisymmetric analysis
- one-click material assignment
- import/export in DXF format
- unlimited undo/redo
- right-click editing shortcuts
- Tunnel Wizard

Elements & Meshing

- triangular or quadrilateral finite elements
- 3 or 6-noded triangles
- 4 or 8-noded quadrilaterals
- one-click mesh generation
- graded, uniform or radial meshing
- mapped meshing
- custom meshing
- check/define mesh quality
- easily apply boundary conditions

Materials

- elastic or non-linear
- strength criteria – Mohr-Coulomb, Generalized Hoek-Brown, Cam-Clay, Modified Cam-Clay, Drucker-Prager, discrete function, anisotropic, Mohr-Coulomb with Cap, Softening/Hardening
- staged material properties
- datum dependent properties
- isotropic, transversely isotropic, orthotropic elastic models
- import from *RocData*

Groundwater

- finite element steady state or transient seepage analysis
- staged groundwater
- material permeability functions
- discharge sections
- piezometric lines
- pore pressure grids
- fully-coupled consolidation
- include pore pressure for effective stress analysis

Support

- staged support installation
- bolt types – end anchored, fully bonded, cable bolts, Swellex, split-set, tiebacks
- liner types – beam, reinforced concrete, geotextile, cable truss
- composite liners
- reinforcement database
- Timoshenko or Bernoulli beam models
- staged liner properties
- elastic or non-linear
- peak/residual strength
- interactive support capacity plots (thrust/moment, thrust/shear) for reinforced concrete liners (includes CSA, ACI, EC2 codes)

Far-field Stress

- constant stress field
- gravity stress field
- multiple stress fields (customize per material)
- load split per stage or material

Finite Element Slope Stability

- automated FE slope stability using shear strength reduction (SSR) method
- define SSR include area
- define SSR exclude area
- import/export *Slide* models

Loads

- constant or linear distributed loads
- concentrated load
- seismic load
- ponded water load
- staged loading
- springs
- dynamic

Joints

- elastic or non-linear
- Mohr-Coulomb, Barton-Bandis, Hyperbolic, or material-dependent slip criterion
- natural or artificial joints
- pressurized joints
- staged joint properties
- statistical modeling of joint networks

Probabilistic Analysis

- Monte Carlo, Latin Hypercube, Point Estimate methods
- random variables - materials, joint properties, field stress
- contour / error plots of statistical output

Data Interpretation

- view stress, displacement, strength factor contours
- effective stress, pore pressure contours
- contour user-defined data
- stress/failure trajectories, deformation vectors
- display deformations to userdefined scale
- query and graph material, support, joint data
- export to Excel
- show values directly on model
- highlight yielded material, support, joint elements
- add iso-contours