Bentley®
Advancing Infrastructure

PLAXIS® 2D
Trusted Geotechnical Finite Element Analysis Software

PLAXIS 2D is a powerful and user-friendly finite-element (FE) package intended for 2D analysis of deformation and stability in geotechnical engineering and rock mechanics. PLAXIS is used worldwide by top engineering companies and institutions in the civil and geotechnical engineering industry. Applications range from excavations, embankments, and foundations to tunneling, mining, oil and gas, and reservoir geomechanics. PLAXIS is equipped with a broad range of advanced features to model a diverse range of geotechnical problems, all from within a single integrated software package.

User-friendly, FE Package

PLAXIS capabilities work together to build a powerful and intuitive finite element package for geotechnical analysis of soil, rock, and associated structures. Renowned for sound computation, PLAXIS offers a large range of material models to accurately model the behavior of various soils and rock types, which together provide realistic assessment of stresses and displacements. Not only does PLAXIS 2D offer intuitive dedicated functionality to perform settlement analysis, it also excels at complex 2D thermal or groundwater flow analysis, and comprehensive dynamic load modeling.

Advanced functionality and digital workflows include the PLAXIS Output program, which consists of a full suite of visualization tools to check details of the underground soil-structure model for powerful and versatile post processing. Also, Python-based scripting facilities are available to couple with other software applications.

Fast and Efficient FE Model Creation

The user-friendly PLAXIS interface guides users across several modes to efficiently create models with a logical geotechnical workflow. PLAXIS 2D models geometry via predefined structural element types and loading types using CAD-like drawing capabilities that lead to fast and efficient finite-element model creation. The soil mode allows you to define multiple boreholes to create soil profiles or geological cross-sections structures. In the structure mode, elements like piles, anchors, geotextiles, and prescribed loads and displacements can be defined. It is also possible to import geometry from CAD and BIM files.

For tunnel solutions, a designer wizard builds off quick creation and can edit tunnel cross-sections, specify reinforcements, tunnel lining, and loading conditions. The Mesh mode features automatic and manual mesh refinements, automatic generation of irregular and regular meshes, and capabilities to inspect the mesh quality.
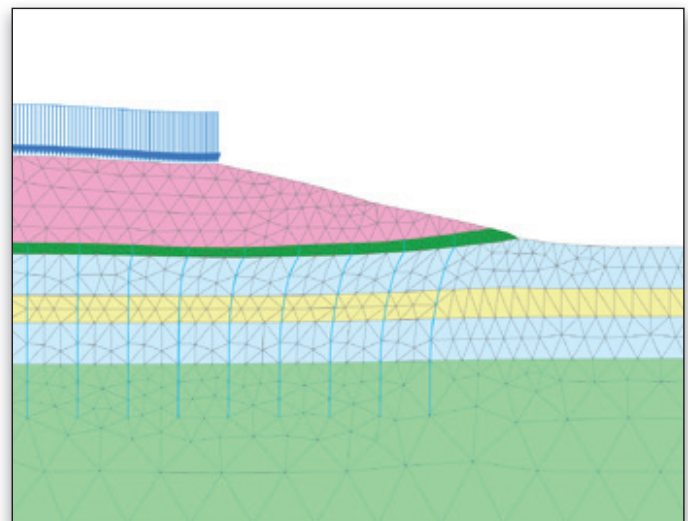
Stability of embankment on soft soil reinforced by rigid inclusions.

Realistic Assessment of Stresses and Displacements

Staged construction mode allows users to accurately model the construction process by activating and deactivating soil clusters and structural elements in each calculation phase. Calculation types offered include; plastics, safety, and consolidation analysis as well as dynamics, with and without consolidation, or fully coupled flow-deformation analysis. PLAXIS is trusted in a broad range of geotechnical challenges and offers various constitutive models ranging from simple linear to advanced highly nonlinear models, so that a wide range of soil and rock behavior can be simulated. The well-proven and robust calculation procedures ensure that calculations converge and provide accurate results for the most common or complex models.

Powerful and Versatile Post Processing

The versatile Output program offers various ways to display forces, displacements, stresses, velocities, accelerations, temperature, and flow data shown in contour, vector, and iso-surface plots. Cross-section capabilities allow areas of interest to be inspected in more detail, and data can be copied from tables for further plotting purpose using other software. The curve manager enables the creation of graphs that can plot various results across a selection of calculation phases.

PLAXIS 2D At-A-Glance

Modeling

- Tunnel deconfinement
- CAD Import and Export*
- Nonlinear geogrids: Elastoplastic (N-ε) and Viscoelastic (time-dependent)
- Polar and rectangular array
- Nonlinear embedded beam row (M-κ diagrams)
- Connections
- Tunnel Designer with easy definition of rockbolts*
- Automate processes with full command line support and remote scripting API *

Material Models

- Industry standard soil models: Hardening Soil, HSsmall, Soft Soil and Soft Soil Creep
- Rock models: Jointed rock, Hoek-Brown with parameter guide
- Concrete
- UDCAM-S with cyclic accumulation and optimization tool
- NGI-ADP
- User-defined soil models*
- Static and dynamic liquefaction models: NorSand, UBCSand, PM4Sand, PM4Silt

Calculations

- Well-proven and robust calculation procedures
- Multicore computing
- K0, Gravity loading and Field stress for initial stress calculations
- Distinguish between a plastic calculation, safety, or consolidation analysis
- Facilities for steady-state and transient groundwater or thermal flow calculations, including flow-related material parameters, boundary conditions, drains, and wells
- Pseudo-static and dynamic analysis, including dynamics with consolidation and free field and compliant base boundary conditions
- Specify load, acceleration, head or temperature variations through time with linear, harmonic or table functions
- Fully coupled flow-deformation analysis
- Convenient and intuitive Phase explorer
- Automatic regeneration of construction stages for geometric changes

Results

- Realistic assessment of stresses and displacements
- Vector, contour and iso-surfaces plots of displacement, stress, pore pressure, temperature, or acceleration
- Use the Output command line to display plots, generate cross-sections or save plots with user-defined resolution
- Curves Manager to create load vs. displacement, Pseudospectral acceleration plots, or cross-section curves
- Automatic centerline extraction for structural forces plots
- Structural forces in volume plates (tunnel lining, retaining wall)
- Resulting Force View
- Plot annotations
- Extensive report and movie generator
- PLAXIS 2D Viewer

Usage

- Rock-mass response and surface settlements due to tunneling, mining, or reservoir depletion
- Slope stability and seepage analysis for large earth dams, tailing dams, embankments, and pit mines
- Predicting differential settlements of buildings adjacent to excavation pits
- Stability of and seepage into excavation pits, lateral displacements of diaphragm walls
- Calculate necessary consolidation time for pore pressure dissipation in undrained loading problems
- Bearing capacity and foundation settlement analysis for high-rise buildings, LNG tanks, and other structures (ie. offshore suction anchors)
- Liquefaction analysis to predict the safety of critical infrastructure like levees or large dams under earthquake loading
- Seismic design of jetties, quays, walls, building foundations
- Stability of dams or levees under rapid drawdown, during seasonal variations of water level or during precipitation or flooding
- Ice wall formation during ground freezing in tunnel construction
- Temperature distribution and propagation into surrounding soils of nuclear waste disposal facilities

Subscription Entitlement Service Supports

- Provides a universal ID to link together all activity within Bentley applications
- Manage license entitlements at a user level, without requiring activation keys or hardware dongles
- Access personal learn material, paths and history, timely product related news, automatic product updates, and notifications
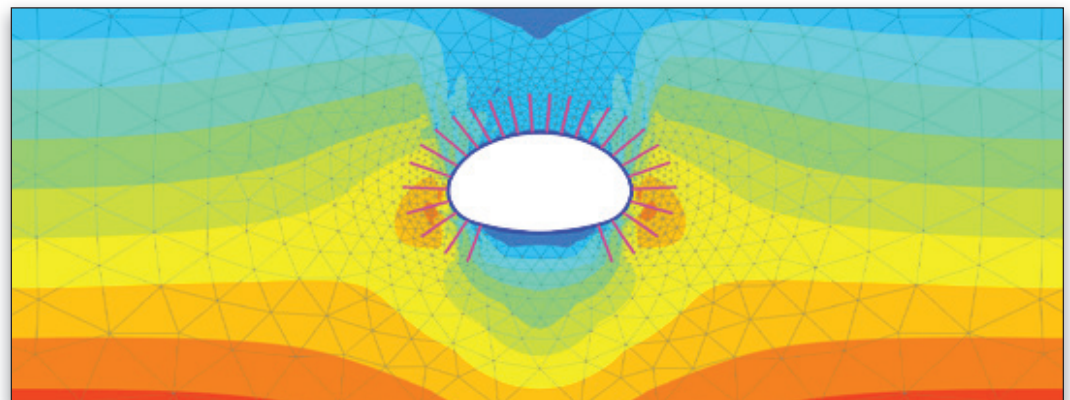
NATM tunnel with rockbolts.

*Some features are dependent on product level or select entitlement

Bentley®
Advancing Infrastructure