![Bentley logo — Advancing Infrastructure]

PLAXIS® 3D
3D Geotechnical Engineering Software

As infrastructure assets are crucially linked to subsurface environments, they are vulnerable to geotechnical risk. PLAXIS 3D allows you to make safe, cost-efficient decisions that offer fast, comprehensive analysis methods in a user-friendly platform. Perform 3D analysis of deformation and stability in geotechnical engineering and rock mechanics with PLAXIS 3D. The intuitive interface guides you across several modes to efficiently create models and is equipped with advanced features to conquer the most common or complex geotechnical projects.

Solve Simple and Complex Infrastructure Challenges

More than ever, you require scalable and safe solutions for excavation. With PLAXIS 3D, you can quickly and reliably generate the sequence of construction for simple and complex excavations with the staged construction mode. PLAXIS 3D can facilitate steady-state and transient groundwater flow calculations, including flow-related material parameters, boundary conditions, drains, and wells.
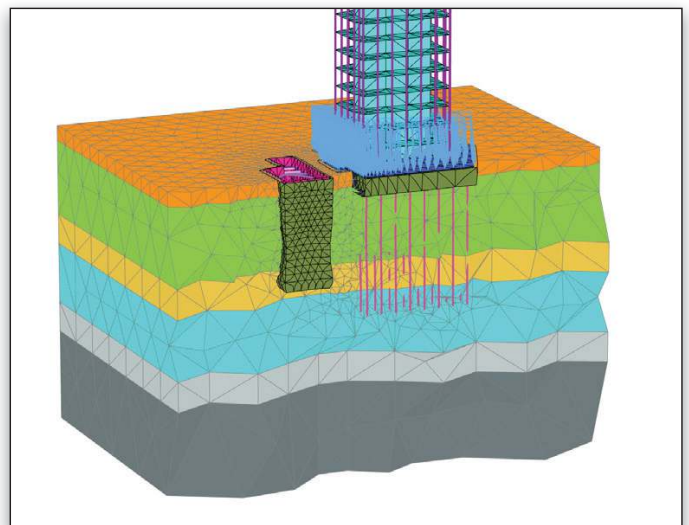
PLAXIS 3D offers solutions for the unique challenges of multifaceted interactions of soil structure in foundations for building, civil, and offshore structures. Interfaces and embedded pile elements allow modeling of relative movements between soil and foundations, such as slipping and gapping. In addition, the core capability of realistic soil models, along with a complete portfolio of visualization abilities, deliver powerful results you can trust.

Fast and Efficient Finite Element Model Creation

Modeling behaviors of earth materials requires sound computational procedures. PLAXIS 3D provides a comprehensive solution for design and analysis of soils, rocks, and associated structures. Developed by geotechnical leaders with over 50 years of experience, Bentley's integrated products allow easy imports of data in many formats for quick model creation. PLAXIS also provides analysis support for optimizing designs, which plays a valuable role in keeping infrastructure safe.

Enhanced Applications with Sound Computations

Soil structure interaction presents unique challenges to the geotechnical engineer. Calculation types offered, like plastic, safety, consolidation,

![3D finite element mesh visualization of an excavation next to a building on a pile raft foundation.]

Excavation next to a building on a pile raft foundation.

fully coupled flow-deformation, or dynamic analysis, allow you to use PLAXIS 3D for a range of geotechnical problems. Finite element modeling in full 3D is easy with drawing tools such as extrude, intersect, combine, and array operations. A large range of material models is offered to accurately model the behavior of various soils and rock types, which, along with PLAXIS 3D's robust calculation procedures, provide realistic assessment of stresses and displacements as demonstrated by dozens of verification studies.

Strengthen Solutions with Digital Workflows

Drive efficiency through multidiscipline workflows from subsurface imports through design and analysis to various outputs. Engineers can easily work through a logical geotechnical digital workflow. Users have total control over post processing. The adaptable Output program offers various ways to display forces, displacement, acceleration, stress, or flow data in contour, vector, and iso-surface plots. Cross-section tools allow areas of interest to be inspected in more detail and data can be exported from tables for further plotting purposes outside of PLAXIS.

PLAXIS 3D allows you to produce the world's most accurate and accessible geotechnical analyses. Bentley's geotechnical applications are backed by world-class expertise and used worldwide to support producing safer structures and environments for all.

Find out about Bentley at: www.bentley.com

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PLAXIS 3D At-A-Glance

Modeling
- Automatic Swept Meshing for more efficient meshes
- Elastoplasticity for beams and plates
- Connections
- Design arbitrary geometries using Combine, Intersect, Extrude, Loft, Blendsurfaces and Revolve around axis tools
- CAD Import and Export *
- Nonlinear geogrids: Elastoplastic (N-ε) and Viscoelastic (time-dependent)
- Polar and rectangular array
- Tunnel Designer with easy definition of rock bolts, umbrella arches and girders*
- Define excavation sequence in the Tunnel Designer *
- Automatic generation of staged construction phases for tunnels *
- 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

Calculations
- Well-proven and robust calculation procedures
- Multicore computing and 64-bit
- K0, gravity loading and field stress for initial stress calculations
- Distinguish between a plastic calculation, safety or consolidation analysis
- Facilities for steady-state or transient groundwater 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, and moving point or line loads
- Specify load, acceleration or head 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, or acceleration
- Structural forces from cylindrical and square volume piles
- Curves Manager to create loads vs. displacement, Pseudospectral acceleration plots or cross-section curves
- Advanced data slicing
- Movable cross-sections
- Extensive report and movie generator
- PLAXIS 3D Viewer

Usage
- Rock-mass response and surface settlements due to tunneling, mining, or reservoir depletion
- Slope stability and seepage analysis for earth and tailing dams, embankments, and open pit mines
- Predicting differential settlements of buildings adjacent to excavation pits
- Stability of and seepage into excavation pits, lateral displacements of diaphragm walls
- Calculate 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 (i.e. offshore suction anchors)
- Liquefaction analysis to predict the safety of critical infrastructure like levees or large dams under earthquake
- Stability of embankments for high-speed railways
- 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

Subscription Entitlement Service Support
- 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

*Some features are dependent on product level or SELECT® entitlement.
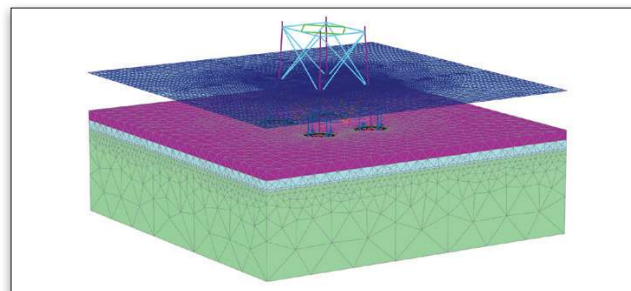
Offshore platform with suction bucket foundation.

Bentley®
Advancing Infrastructure

Bentley PLAXIS® 3D Product Tiers
Find the right product level for your needs

Project teams and their requirements can change. To conquer common or complex geotechnical challenges with confidence, you need to use the appropriate capabilities that meet your current needs.

PLAXIS 3D is a user-friendly, finite element package with trusted computation that is used by geotechnical engineers worldwide. We offer three flexible options, each tailored to the different geotechnical analysis needs of any firm:

- **PLAXIS 3D** offers all the essential functionality to perform everyday deformation and safety analysis for soil and rock, which do not require the consideration of creep, steady state groundwater, consolidation analysis, or any time-dependent effects.

- **PLAXIS 3D Advanced** enhances your geotechnical design capabilities with more advanced features and material models to consider creep or flow-deformation coupling through consolidation analysis. It also solves your problems faster than PLAXIS 3D with the multicore solver.

- **PLAXIS 3D Ultimate** augments the most comprehensive functionality to deal with the most challenging geotechnical projects. The former products 3D PlaxFlow Module and 3D Dynamics Module are included in PLAXIS 3D Ultimate. You can analyze the effects of vibrations in the soil, like earthquakes and moving traffic loads. You can also simulate complex hydrological conditions through time-dependent variations of water levels or flow functions on flow functions on model boundaries, as well as soil boundaries.

Features	PLAXIS 3D	PLAXIS 3D Advanced	PLAXIS 3D Ultimate	Available without GSE*
PROJECT AND MODEL PROPERTIES				
Selection of imperial and SI units for length, force, etc.	✓	✓	✓	✓
GEOMETRY CREATION				
Create Borehole Tool	✓	✓	✓	✓
Select, Move, Rotate, and Array Tools	✓	✓	✓	✓
Create Point, Line, Nurbs Curve, and Surface Tools	✓	✓	✓	✓
Polycurve Designer	✓	✓	✓	✓
Intersect, Combine, Extrude, Revolve around Axis, Loft Polycurve, and Blend Surfaces Tools	✓	✓	✓	✓
Create Point, Line, and Surface Load Tools	✓	✓	✓	✓
Create Point, Line, and Surface Prescribed Displacement Tools	✓	✓	✓	✓
Create Embedded Beam, Plate, Geogrid, Fixed-end Anchor, Node-to-Node Anchor, and Interface Tools	✓	✓	✓	✓
Create Surface Contraction Tool	✓	✓	✓	✓
Create Well, Line Drain, Surface Drain, and Surface Groundwater Flow Boundary Condition Tools		✓	✓	✓
Create Added Mass Tool			✓	✓
Create Moving Point and Line Load Tools			✓	✓
Tunnel Designer	✓	✓	✓	
Reinforcement (Rockbolts and Umbrella Arches) Definition in the Tunnel Designer	✓	✓	✓	
Girder/beam Definition in the Tunnel Designer	✓	✓	✓	
Tunnel Splitting Tool	✓	✓	✓	
Definition of Excavation Sequence in the Tunnel Designer	✓	✓	✓	
Automatic Generation of Staged Construction Phases for Tunnels	✓	✓	✓	

*GSE – Geotechnical SELECT Entitlement.

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Features	PLAXIS 3D	PLAXIS 3D Advanced	PLAXIS 3D Ultimate	Available without GSE
SOIL MATERIAL MODELS				
Linear Elastic	✓	✓	✓	✓
Mohr-Coulomb	✓	✓	✓	✓
Hardening Soil	✓	✓	✓	✓
Hardening Soil Small Strain Stiffness	✓	✓	✓	✓
Modified Cam-clay	✓	✓	✓	✓
Jointed Rock Model	✓	✓	✓	✓
NGI-ADP	✓	✓	✓	✓
Hoek-Brown, with Parameter Guide	✓	✓	✓	✓
Soft Soil		✓	✓	✓
Soft Soil Creep		✓	✓	✓
Sekiguchi Ohta (Viscid)		✓	✓	✓
Sekiguchi Ohta (Inviscid)		✓	✓	✓
UDCAM-S and Cyclic Accumulation Tool		✓	✓	✓
Concrete		✓	✓	✓
User Defined Soil Models		✓	✓	✓
UBC3D-PLM (liquefaction)			✓	✓
SOIL MATERIAL DRAINAGE TYPES				
Drained	✓	✓	✓	✓
Undrained A	✓	✓	✓	✓
Undrained B	✓	✓	✓	✓
Undrained C	✓	✓	✓	✓
Nonporous	✓	✓	✓	✓
STRUCTURAL ELEMENT MATERIAL TYPES				
Elastic and elastoplastic plates	✓	✓	✓	✓
Elastic, elastoplastic, elastoplastic (N-Epsilon) and viscoelastic geogrids	✓	✓	✓	✓
Elastic and elastoplastic beam	✓	✓	✓	✓
Elastic and elastoplastic embedded beam	✓	✓	✓	✓
Elastic, elastoplastic and elastoplastic with residual strength fixed-end and node-to-node anchors	✓	✓	✓	✓
DYNAMIC AND GROUNDWATER FLOW MATERIAL PROPERTIES				
Groundwater properties, including soil classification systems (Hypres, USDA, etc.) and predefined data sets for (approximate) Van Genuchten models for soil materials	✓	✓	✓	✓
Rayleigh damping for soil and structural elements			✓	✓
INITIAL CALCULATION TYPES				
K_0 procedure	✓	✓	✓	✓
Gravity loading	✓	✓	✓	✓
Field stress	✓	✓	✓	✓
Ground water flow only			✓	✓

Features

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DEFORMATION CALCULATION TYPES				
Plastic	✓	✓	✓	✓
Safety	✓	✓	✓	✓
Consolidation		✓	✓	✓
Dynamic			✓	✓
Dynamic with consolidation			✓	✓
Fully coupled flow-deformation			✓	✓
PORE PRESSURE CALCULATION TYPES				
Phreatic level	✓	✓	✓	✓
Use pore pressures from previous phase	✓	✓	✓	✓
Steady state groundwater flow		✓	✓	✓
Transient groundwater flow			✓	✓
MISCELLANEOUS FEATURES, TOOLS AND INTEROPABILITY				
Create cluster field stress	✓	✓	✓	✓
Staged construction and automatic regeneration of construction stages	✓	✓	✓	✓
Multicore and parallel calculation		✓	✓	✓
Pseudostatic analysis		✓	✓	✓
Generate stratigraphy from imported CPT Logs	✓	✓	✓	
SoilTest and parameter optimization tool	✓	✓	✓	
Calculation manager	✓	✓	✓	
CAD Import (incl. IFC, point clouds, water levels, borehole top and bottom) and Export	✓	✓	✓	
Command line input (Input, Output, and SoilTest)	✓	✓	✓	✓
Command line autocomplete (Input, Output, and SoilTest)	✓	✓	✓	
Commands runner (Input, Output, and SoilTest)	✓	✓	✓	
Macro library and running macros (Input, Output, and SoilTest)	✓	✓	✓	
Remote scripting for Input, Output, and SoilTest	✓	✓	✓	
Scripting reference	✓	✓	✓	
ProjectWise integration, loading from and saving to ProjectWise server	✓	✓	✓	
Bentley Cloud Services: personal and project portal, project association	✓	✓	✓	
Import of and export to ISM	✓	✓	✓	
PLAXIS 3D coupling tool for STAAD.Pro	✓	✓	✓	
TIME DEPENDENT FUNCTIONS				
Time dependent groundwater flow components for water levels, groundwater flow boundary conditions, and soil clusters			✓	✓
Definition of groundwater flow functions to specify time dependent changes in head or prescribed discharge, etc.			✓	✓
Dynamic components in x and y direction for point and line loads or displacements			✓	✓
Definition of dynamic multipliers to create vibration and earthquake signals			✓	✓
Scaling tools, Fourier, response spectra and Arias intensity plots and drift correction for input earthquake signals			✓	✓
Definition of Movement functions to specify time dependent changes in velocity			✓	✓

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Features	PLAXIS 3D	PLAXIS 3D Advanced	PLAXIS 3D Ultimate	Available without GSE
DYNAMIC BOUNDARY CONDITIONS				
Viscous			✓	✓
Compliant base and free field boundaries			✓	✓
All nodes fixity			✓	✓
POSTPROCESSING AND RESULTS				
Various ways to display forces, displacements, stresses, and strains in contour, vector, and iso-surface plots	✓	✓	✓	✓
Tables of results with copy, sorting, and filter options	✓	✓	✓	✓
Curve manager to plot graphs of various results across a selection of calculation phases	✓	✓	✓	✓
Load-displacement curves	✓	✓	✓	✓
Cross-section tools and cross-section curves	✓	✓	✓	✓
Automatic and manual centerline extraction for structural forces plots of volumes piles	✓	✓	✓	✓
Resulting forces view	✓	✓	✓	✓
Plot annotations	✓	✓	✓	✓
Animations	✓	✓	✓	✓
Report generator	✓	✓	✓	✓
Printing and saving plots and curves	✓	✓	✓	✓
Plots and curves of accelerations, velocities, structural forces envelopes for dynamic phases			✓	✓
Curve plots of Pseudo Spectral Acceleration, relative displacements and switching between time and frequency representations			✓	✓
Plots and curves of pore pressures for phreatic level calculations	✓	✓	✓	✓
Plots and curves of pore pressures, saturation, suction, and Darcy flux for steady state groundwater flow calculations		✓	✓	✓
Plots and curves of pore pressures, saturation, suction, and Darcy flux for transient groundwater flow or fully coupled flow deformation calculations			✓	✓
Export of results to Paraview	✓	✓	✓	