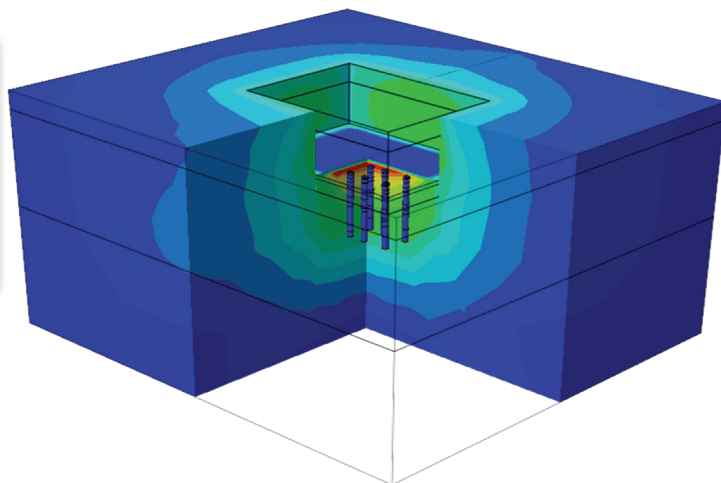


DIANA

GEOTECHNICAL SOLUTIONS



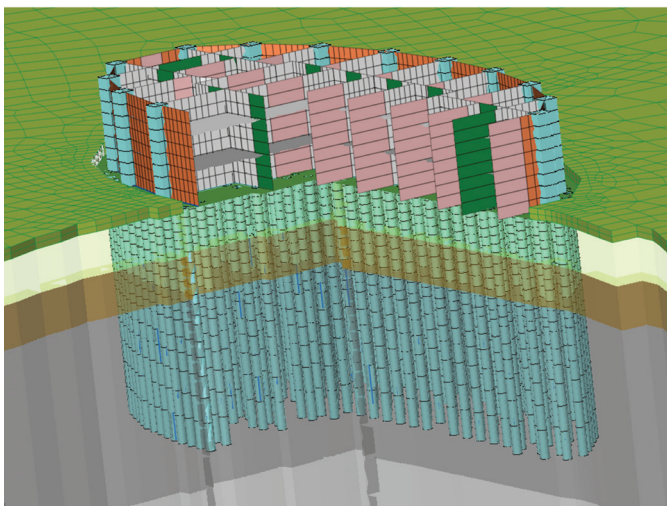
Geotechnical applications, and the interaction between the ground and structure, often provide engineers with technically demanding challenges that are best solved with DIANA. The program provides a wide range of state-of-the-art constitutive models for tackling soil and rock materials in applications as diverse as foundations, embankments, tunnels, excavations, slope stability, mines and dams.

The analysis capabilities for pore pressure and consolidation, groundwater flow, earthquake and liquefaction problems are some of the most advanced available and are essential for accurate analysis of these types of coupled problems.

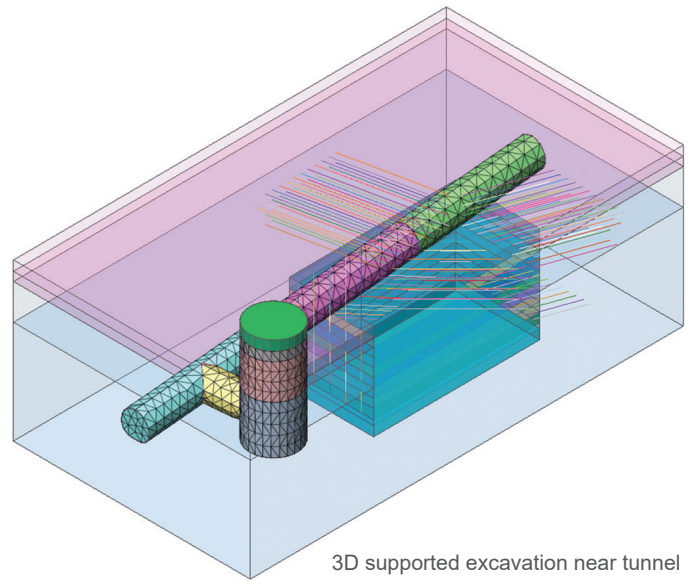
DIANA also offers advanced features to model steel and reinforced concrete structures that interact with the ground.

Geotechnical Specific Features

- In-situ stress (K_0 procedure/gravity loading/pre-stress) and pore-pressure initialisation
- Construction staged analysis
- Drained/undrained analysis
- Seepage analysis (steady state/transient)
- Saturated or partially saturated flow
- Consolidation analysis (full coupled stress-flow analysis)
- Pressure dependent degree of saturation
- Freely moving phreatic surfaces
- Porosity or saturation dependent permeability
- Deformation dependent density and porosity
- Dynamic (linear and nonlinear) and liquefaction analysis
- Special (embedded) pile elements with nonlinear pile shaft and toe interfaces
- Anchors, nails, and rock bolt modelling
- Geotextiles
- Strength reduction analysis (ϕ -c)
- Engineering liquefaction



piled raft analysis



3D supported excavation near tunnel

Geotechnical Analysis

Material models suitable for soil & rock

- Mohr-Coulomb, Tresca
- Drucker-Prager, Von Mises
- Transversely Isotropic
- Duncan-Chang
- Hoek-Brown
- Jointed rock
- Modified cam-clay
- Jardine (London clay)
- Modified Mohr-Coulomb (cap model)
- Classic brick
- Special Interface models
- User-supplied subroutine

Dynamic analysis and liquefaction

- Eigenvalue analysis (eigenfrequencies, eigenmodes, participation factors, effective masses)
- Direct frequency response analysis
- Modal frequency response analysis
- Spectral response analysis (ABS, SRSS, and CQC modal combinations)
- Linear and nonlinear time domain analysis (total, transient and steady state solution)
- Various time integration methods, e.g. Newmark, Wilson-theta, Runge-Kutta
- Hybrid frequency-time domain analysis
- Fluid-structure interaction
- Multi-directional base acceleration loads
- Prescribed nodal acceleration loads
- Distributed mass elements (2D line elements + 3D surface elements)
- Bounding/boundary elements for far field behaviour (2D line elements + 3D surface elements)
- Viscous, structural, and continuous damping
- 2D/3D liquefaction models including user-supplied models

General Product Functionality

Element types

- Truss
- Timoshenko, Bernoulli, and Mindlin beam
- Plane stress and plane strain
- Complete/general plane strain
- Axisymmetric
- Plate bending
- Flat, curved and layered shells
- Solid
- Composited (line/surface)
- Interface
- Contact
- Discrete spring/dashpot
- Base spring
- Bounding
- Point mass/damping
- Embedded reinforcements
- Flow
- Embedded pile
- Boundary surface
- Perfectly Matched Layers (PML)

Preprocessing

- CAD like geometry modelling functionality
- Parasolid built-in tools
- Import CAD/Revit file formats
- Python scripting
- Advanced selection methods
- Advanced geometry modelling
- Boolean operation for solid modelling
- Auto clash detection
- Geometry check and repair tools
- Practical mouse snapping
- Auto-, map- and protrude-mesh methods
- Hybrid mesher
- Mesh manipulation and check functionality
- Loads and boundary conditions applicable both on geometry or mesh
- Function based definition of loads and boundary conditions
- MS-Excel compatible tables

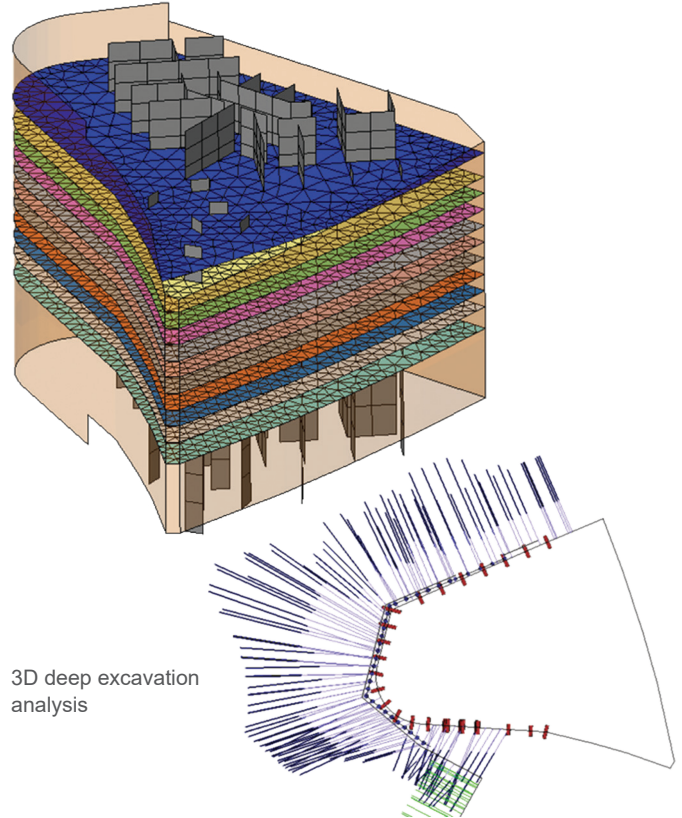
Postprocessing

- Contour and vector plots
- Iso-surface, slice, clipping and partition plot
- Diagram and vector plot
- Results extraction to MS-Excel compatible table
- Screen-shots in different picture formats
- Result animation
- Automatic report generation

Solution procedures

- Automatic solver selection
- Out-of-core direct equation solvers
- Nonlinear equation solvers
- Automatic substructuring
- Eigenvalue analysis
- Newton-Raphson, Quasi-Newton, Linear and Constant stiffness iterative procedures
- Load and displacement control incremental procedures

- Arc length control incremental procedure
- Adaptive load and time increments
- Automatic incremental loading
- Direct, iterative and eigen solvers with parallel processing
- Updated and total Lagrange geometrical nonlinear formulation



3D deep excavation analysis

Services

Support & training

Successful finite element modelling requires sound understanding of the background theory with good engineering judgment. We at DIANA FEA BV together with our partners are dedicated to provide the highest level of service for DIANA:

- Personalised hotline and email support by highly qualified staff
- Customised training solutions
- Regular training courses
- Extensive technical and theoretical manuals
- Online training sessions

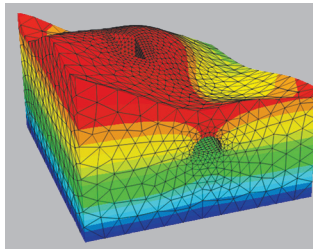
Analysis consultancy

DIANA FEA BV carries out analysis consultancy projects on behalf of their clients, which includes the analysis with DIANA and the interpretation of results.

Software services

DIANA FEA BV Consultants and software development team can provide customised solutions for your engineering problems:

- Specialised software with dedicated GUI
- New modelling capabilities development and implementation
- Integration with customer software



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