

# Optum<sup>+</sup>G3

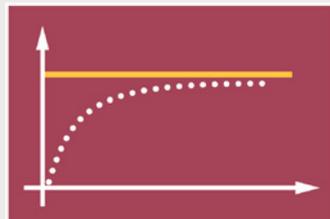
GEOTECHNICAL DESIGN SOFTWARE



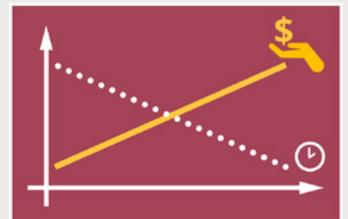
## OPTUM G3 - GEOTECHNICAL DESIGN REINVENTED



LOAD DISPLACEMENT ANALYSIS



LIMIT LOADS - IN A SINGLE STEP!



3D FE - FASTER THAN EVER





## 3D FE DESIGN TOOL FOR GEOTECHNICAL PRACTITIONERS - REINVENTED

OPTUM G3 is a unique Finite Element program allowing engineers to design any geotechnical problem in 3D with never before seen speed, accuracy, simplicity and pure enjoyment!

### + OPTUM G3 - DESIGNED FOR DESIGN

At a first glance OPTUM G3 might, either seem like something entirely new or something like “all the rest”. Not strange since this is in fact what OPTUM G3 is: Classical FE in a completely new framework - offering:

- + Standard load incremental FE analysis with associated or non-associated flow rule
- + Limit Analysis ideal for ULS design

The computational core, based on the traditional Finite Element approach, has been re-built upon an entirely new and novel algorithmic platform based on state-of-the-art mathematical optimization algorithms. Benefits?

- + Limit Analysis and FE analysis in one and same package
- + Unprecedented robustness
- + Speed
- + Accuracy

All in all this results in unseen efficiency and flexibility in your workflow, and -yes- even fun and enjoyment solving complex and challenging 3D geotechnical problems.

OPTUM G3 is a true paradigm shift in the use of FE calculations for practical engineering design in 3D.

### + ELASTO PLASTIC ANALYSIS

This is the classical and most used analysis type in all conventional FE packages when either solving bearing capacity type problems (ULS) or settlement type jobs (SLS). OPTUM G3, of course, offers this analysis type. Use in connection with either associated or non-associated materials models.

### + LIMIT ANALYSIS

In many cases you might actually just be looking for the bearing capacity AND NOT interested in settlements. This is often the approach when calculating the Ultimate Limit State. You can now, using Optum's unique technology, calculate bearing capacities in a single step using the Limit Analysis option. The program even allows you to calculate upper and low bound values providing you with a valuable bracket of the exact solution to the posed problem. This helps provide you with confidence and transparency and helps you move faster and more efficiently ahead.

### + ROBUSTNESS AND EFFICIENCY

The computational core of OptumG3 builds on state-of-the-art numerical algorithms that mark a radical departure from tradi-

tional approaches. These algorithms lead to a level of robustness and efficiency unmatched by any existing programs for geotechnical finite element analysis. Failure to converge and similar “numerical problems” that continue to haunt conventional finite element programs are non-issues in OPTUM G3.

As such, tedious and time consuming tweaking of algorithmic parameters is unnecessary and all attention can be devoted to what it is all about, namely the physics of a given problem.

### + AUTOMATIC ADAPTIVE MESH REFINEMENT

As a standard part of all analyses, it is possible to use automatic adaptive mesh refinement. Combined with ability to compute upper and lower bounds on quantities of interest, adaptive mesh refinement provides a powerful tool for maximizing accuracy while keeping the computational cost at a minimum.

This feature is not available in any existing packages for geotechnical finite element analysis.

### + UPPER, LOWER AND MIXED BOUNDS

Conventional FE provide solutions that are on the unsafe side - ALWAYS! Refining the mesh leads to a lower bearing capacity and larger settlements - ALWAYS! Question is: BY HOW MUCH? This question should always be addressed and is answered by performing a tiering and time consuming convergence analysis - not the most enjoyable activity.

In OPTUM G3, with Upper and Lower bounds available, an estimate of the exact solution and a measure of the worst-case error are immediately available, both of which may be improved by using more elements. OPTUM G3 also introduces the unique Mixed element created to provide results between Upper and Lower bounds. Experience never before seen precision in 3D simulations.

### THE USER INTERFACE

Its modern graphical user interface ensures an intuitive and efficient workflow. No hidden menus and hard to find buttons or fields. Models are easily created, materials and loads applied and results calculated and viewed.

### MODELLING IN OPTUM G3

Never before has 3D modelling been so easy. We have taken the simplistic approach from OPTUM G2 and expanded it to 3D. The clear aim and goal has been to allow geotechnical practitioners without prior knowledge of 3D modelling to get started immediately. We strongly believe we have come a long way in achieving this goal.

You can either setup 3D geometry directly in OPTUM G3 applying the unique and very user-friendly modelling tools or choose to import geometry from a 3rd party CAD tool. The choice is yours.

## + FEATURES

**+ Efficient and Robust Algorithms**  
State-of-the-art algorithms ensure unmatched efficiency and robustness.

**+ Adaptive Mesh Refinement**  
For all analyses – maximize accuracy while minimizing computational time.

**+ Upper and Lower Bounds**  
Rigorous bounds on quantities of interest including bearing capacities and displacements.

**+ Accurate Soil and Rock Models**  
Mohr-Coulomb, Tresca, Anisotropic Undrained Shear (AUS) model.

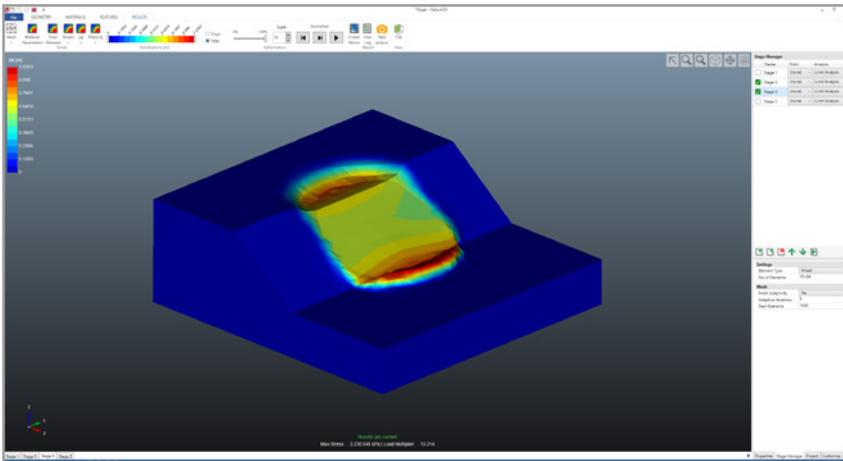
**+ Solid modelling**  
No prior 3D modelling experience is required  
Unique and user-friendly solid modelling capabilities.

**+ Material Parameter Distributions**  
Convenient import of user generated material parameter distributions.

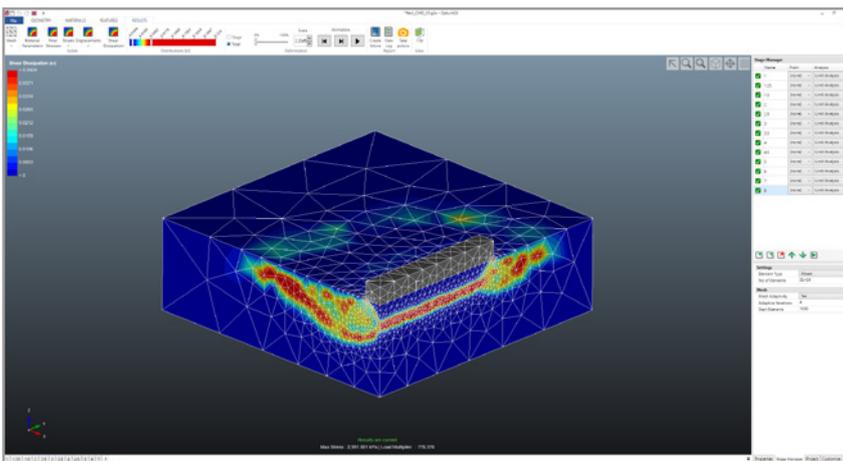
**+ Fast, robust and accurate**  
Unprecedented speed, robustness and accuracy.  
Increase your performance.

**+ Command line version**  
Bypass the graphical user interface and call the computational core via command prompt.

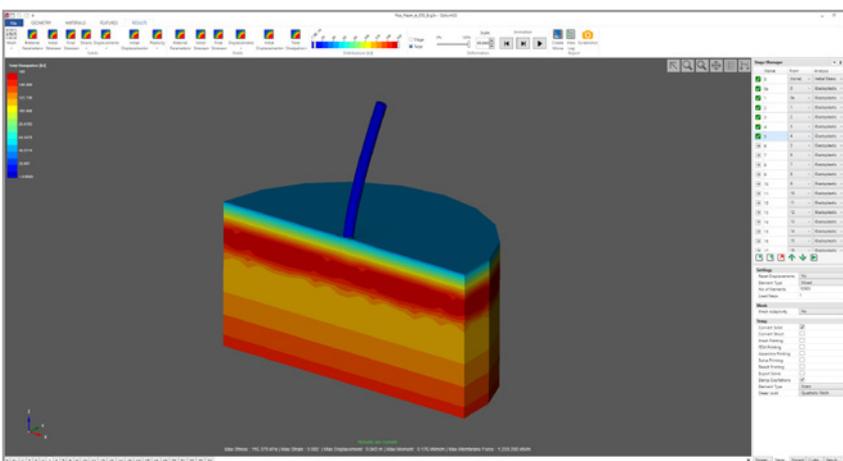
**+ CAD Import and Export**  
Functionality for importing and exporting geometry in DXF format.



**3D slope stability problem** solved using OPTUM G3's unique Limit Analysis.



**Automatic adaptive mesh refinement** ensuring maximum accuracy at minimum computational cost.



**Soil and Rock Models** including Mohr-Coulomb, Tresca (Standard and generalized) and Anisotropic Undrained Shear (AUS).



# FREE DOWNLOAD

Visit [www.optumce.com](http://www.optumce.com) to download your copy of the latest version of OPTUM G3.

TRY IT FREE FOR 30 DAYS

## FULLY SUPPORTED

Whether you are in need of technical advice or assistance with your model, our support team is always available to offer expert advice on all aspects of the software.

### + SOIL AND ROCK MODELS

**+Mohr-Coulomb:** the classic benchmark model including tension cut-off. Use associated flow rule in connection with Limit Analysis for determining bearing capacity, and more refined non-associated flow rule in connection with a more classic Elastic-Plastic analysis. Both options are possible.

**+Drucker-Prager:** similar to but sometimes preferred over Mohr-Coulomb for rock and concrete.

**+Tresca:** Standard and Generalized versions, the latter being relevant for axisymmetric analysis

**+AUS:** Anisotropic Undrained Shear model for advanced analysis of soft soils displaying anisotropic strength and stiffness

**+Elastic:** Simple and useful material model for representing structural elements and concrete

**+Rigid:** A very useful material for modelling structural elements, such as slabs and walls, with infinite stiffness - without any numerical problems

### + ANALYSIS TYPES

**+Limit Analysis:** Fast and rigorous evaluation of upper and lower bounds on bearing capacity, stability numbers, etc. With introduction of the new Mixed Element 3D simulations have never been faster, easier and more precise.

**+Strength Reduction:** Fast and rigorous evaluation of upper and lower bounds on factors of safety. Extremely fast and powerful in connection with automatic adaptive mesh refinement.

**+Elastoplastic:** Fast and accurate analysis using a variety of basic and advanced constitutive models. Use either associated or non-associated flow rules.

**+Initial Stress:** Determination of initial stresses on the basis of a specified earth pressure coefficient (arbitrary geometries)

**+Elastic Analysis:** The simplest analysis type but still useful for various verifications.

**+Staged Construction:** convenient and intuitive sequencing of construction stages.

### + STRUCTURAL ELEMENTS

**+Plates:** Elastoplastic plates, possibly with elastoplastic hinges, for modelling walls, tunnel linings, foundation skirts, etc.

**+Interface elements:** For modelling discontinuities, faults, and similar features

### + OTHER FEATURES

**+Matlab API:** Bypass the graphical user interface and call the computational core via Matlab. Great for setting up parametric models.

**+CAD import:** Import advanced geometry directly into OPTUM G3

**+Language support:** Work in your preferred language.



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