ITASCA™
Denver, Inc.

APPLICATIONS

Mine Dewatering Planning

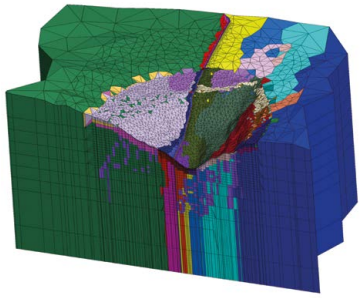
- Prediction of inflow to underground mine workings and open pits
- Prediction of requirements and schedule of dewatering wells and drainage galleries

Environmental Impact Assessment

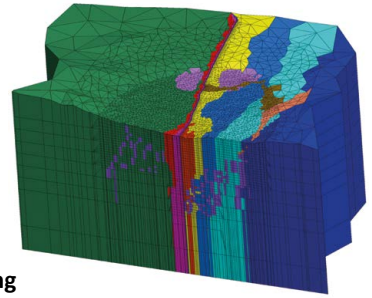
- Drawdown predictions
- Assessments of impacts on surface water
- Pit-lake infilling simulations

Pore-Pressure Analysis

- As an input to ground-stability analysis
- Assessments of effectiveness of various pore-pressure reduction schemes



Pre-Mining



During Mining

SOFTWARE CLIENTS AND SERVICES

There are more than 5 000 users of **ITASCA** software worldwide. **ITASCA** software has been sold in over 52 countries, finding wide acceptance in a range of engineering fields and becoming, in some cases, the standard numerical modelling tool for mining-related analyses.

ITASCA offers training in the use of its codes to interested clients. Training can be offered to clients at their location. In addition, general classes are offered from time to time as part of professional conferences or symposia.

In addition to a complete range of technical support that includes detailed documentation (the software and the complete manual set are provided on CD-ROM), and access to technical support staff, **ITASCA** hydrogeologists are available as consultants on modelling projects. In cases where access to expert modelling capabilities can enhance either efficiency or use of resources, clients of **ITASCA** software may find this to be an excellent option in completing their modelling tasks.

TO ORDER OR FOR INFORMATION:

GROUNDWORK

Groundwork Consulting (Pty) Ltd.

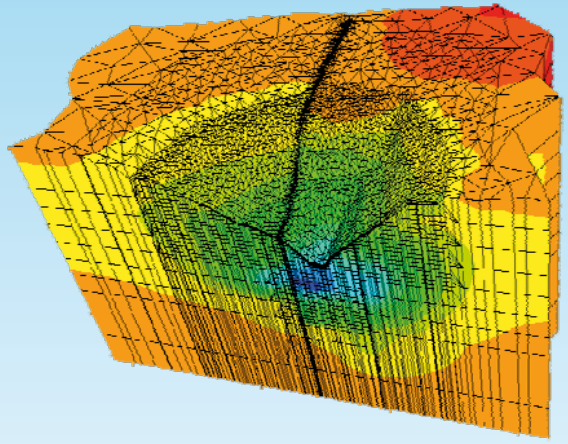
Katinka Tribelhorn
Software Sales Coordinator
Tel: (011) 482 8836/8

www.groundwork.co.za
www.itascadenver.com

INTRODUCING

MINEDW™

3-DIMENSIONAL FINITE-ELEMENT GROUNDWATER FLOW CODE FOCUSING ON MINING APPLICATIONS



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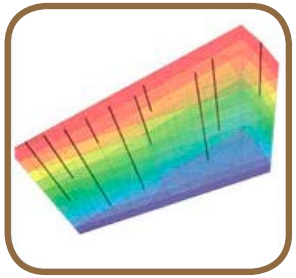
FEATURES

- **Finite-Element Grid** – The grid is specified in terms of triangular prisms and facilitates representation of complex geometries and highly-variable spatial discretization, which is particularly useful for mining applications with complex geologic structures and steep hydraulic gradients.
- **Progressive Geometry** – The elevation of nodes of the finite-element grid can be defined to vary through time. This enables more accurate representation of the underground workings and open pits according to the mine schedules being evaluated.
- **Saturated/Unsaturated Flow** – The finite-element grid can remain fixed through time (with the exception of excavations), and the saturated flow domain can change through time in accordance with changes in the water table, further facilitating representation of the spatial hydrogeologic variability of the groundwater system without additional computational overhead of solving unsaturated flow equations.
- **3-D Graphics** – Represent geology, model domain, pit geometry, groundwater heads, and pore pressures in 3-D.
- **Flexible Boundary Conditions** – Boundary conditions can be represented as specified-head, specified-flux, and internal source-sink terms (each of which can be variant or invariant with time), or as variable-flux boundaries that simulate time-variant fluxes in response to changing boundary heads and an infinite aquifer.
- **Very Transmissive Zones** – By defining links between specific node pairs with enhanced conductivity, very transmissive zones can be used to accurately represent tunnels, underground workings, declines, conductive faults, wells pumping from multiple layers, etc.
- **Groundwater/Surface-Water Interaction** – Streams are simulated as river networks of hydraulic compartmentalization and the model simulates river depletions and additions from exchange with groundwater.
- **Evaporation/Evapotranspiration** – Loss of water from bare/vegetated soils can be simulated and is proportional to the distance between the ground surface and water table, with maximum evaporation rate and extinction depth as constraints.
- **Pit Lakes** – Excavation and pit-lake infilling of multiple pits can be simulated within the same model domain and their respective mining schedules represented simultaneously. The model also provides node-by-node fluxes into/out of the pit lake, evaporation and precipitation on the lake surface, and predictions of lake stages as a function of time, which can readily be used to predict detailed hydrodynamic and geochemical pit-lake conditions and to predict pit-wall seepage during mining.

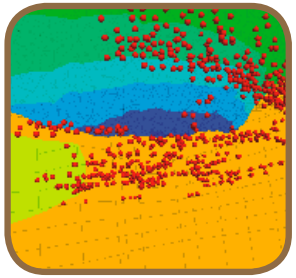
Project Locations using *MINEDW™*

***MINEDW* is used at more than 50 mines throughout the world for mining-related issues in diverse hydrogeologic and climatic conditions.**

- **Time-Variant Conductivity** – Can be used to represent the zone of relaxation around excavations, backfilling operations, longwall and room-and-pillar coal mining, freeze-thaw conditions, or other scenarios where hydraulic conductivity may change during the simulation period.
- **Numerically Stable** – Due in part to the finite-element grid and the numerical methods applied in the model, ***MINEDW*** is typically very stable numerically. This is particularly important in cases where there is a high degree of hydraulic compartmentalization with steep hydraulic gradients.

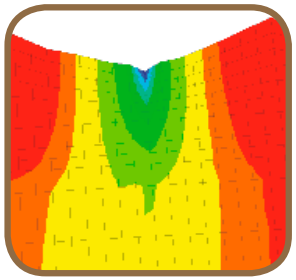


Observation Wells



Dewatering Drains

Collapsing Mesh



Pumping Drawdown

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