



Underground Metals Solutions

Integrated planning
tools for underground
metals operations

An integrated platform



End-to-end software suite for an optimized, controlled and reconciled process

Deswik uses best practice mine planning techniques embedded in next generation software enabling you to spend more time analyzing and planning scenarios rather than manipulating data.

Built on our core software modules Deswik.CAD and Deswik.Sched and linked via Deswik.IS, our integrated approach to mine planning helps our clients to deliver more with their mine planning expertise.

Deswik has developed a fresh and innovative range of unique tools that span the value chain from receipt of a geological model through to reporting for costing. Our software incorporates design and scheduling features across the core platform and associated modules, including:

- » Deswik.CAD
- » Deswik.GeoTools
- » Deswik.MDM
- » Deswik.OPS
- » Deswik.Sched

Strong technical solutions tailored to specialized industry needs

Key Benefits

- » Integrated optimization, design, reserving, scheduling, blending & equipment resourcing
- » Integrated short-term through to long-term schedules
- » Powerful resource-based Gantt scheduling
- » Produce schedule animations for clear communication
- » Audit, manipulate and prepare geological data for mine planning
- » Schedule development, production and all ancillary and secondary tasks
- » Simplify planning systems while delivering value driven plans for complex mines
- » Advanced tools for value adding activities:
 - Auto development designer
 - Underground tabular design toolbox
 - Development and CMS solids creation
 - Backfill planning and reconciliation

Optimization

- » Schedule optimization tools allow you to maximize project NPV
- » Underground stope shape optimization using the industry-leading MSO (Mineable Shape Optimizer)
- » Automatically generate highest value stope solids across a range of mining method geometries and orebody types
- » Export and import scenario settings for rapid setup of new projects and re-evaluation of scenarios against new geological data
- » Optimize production targets at draw points

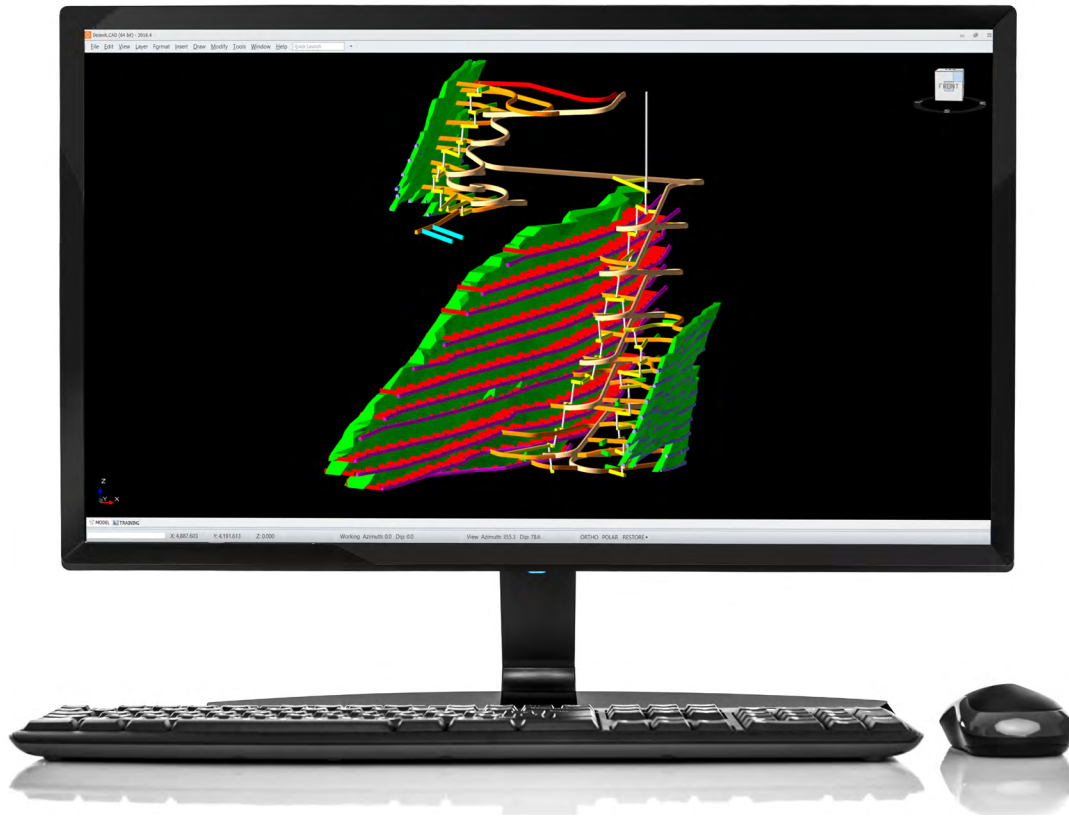
Reconciliation

- » Powerful stope and development reconciliation tools
- » Comprehensive reporting including direct export to Microsoft Excel
- » Reconciliation values written back to output solid attributes

Automated Setup

- » Spatial or attribute-based dependencies
- » Equipment resource leveled schedules
- » Schedule constraints, objectives & material flows in a single integrated interface

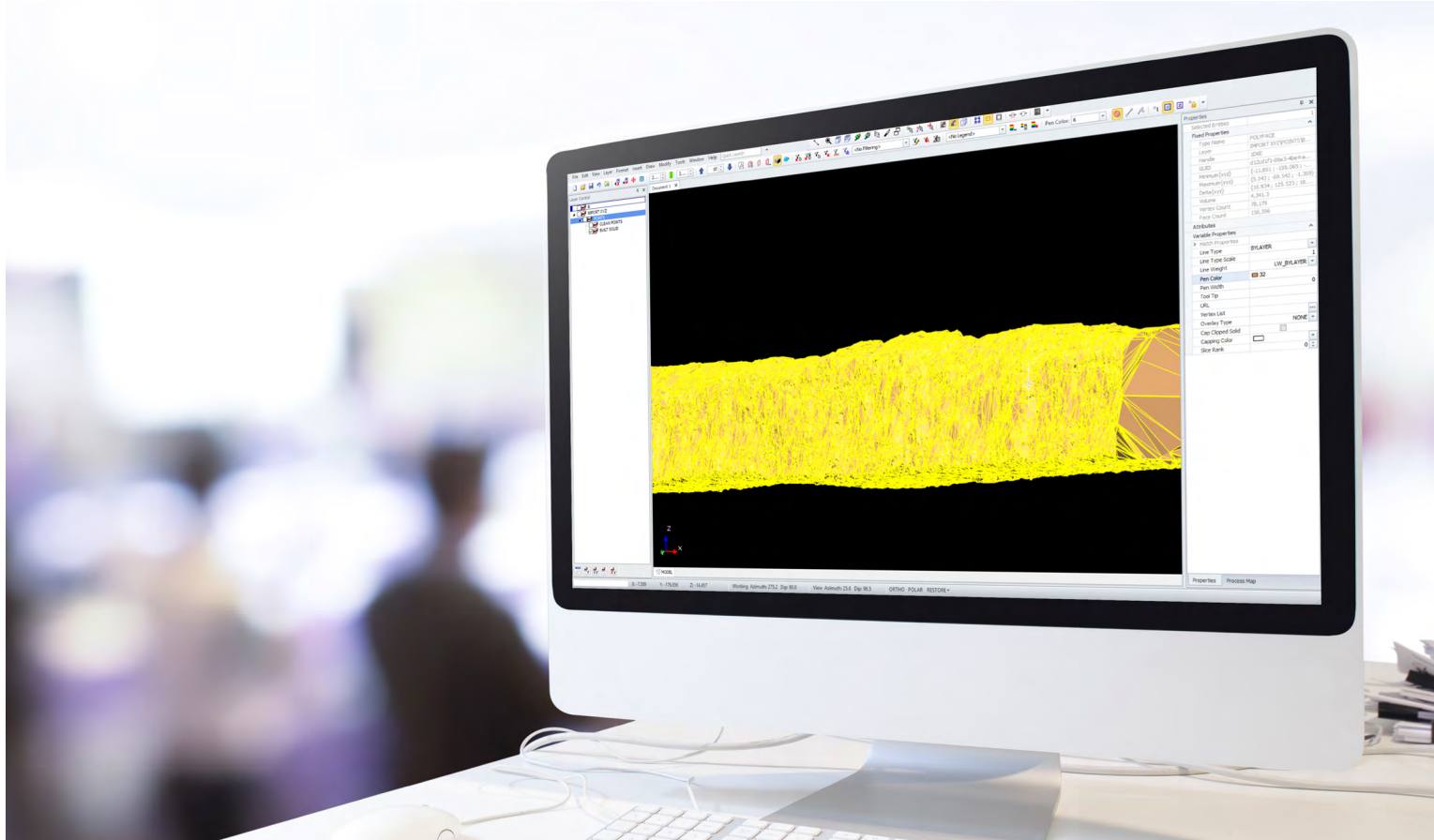




Deswik.AdvUGM

Advanced functionality tailored to the specialized demands of underground metals operations

- » Auto development designer
 - Uses rule-based processing to rapidly lay out development and panels for underground mining operations
 - Automates standard polyline manipulation tools as well as formula-based attribute assignment
- » Process CMS
 - Import CMS polylines or triangles and stitch them together to create a closed solid
 - Rapidly generate shells around CMS point cloud data
- » Backfill planning and reconciliation
 - Generate staged backfill solids based on material characteristics and fill volumes from nominated fill points on a 3D stope void solid
 - Reconcile actual fill amounts against required fill and determine void locations
- » Calculate stereonets
 - Import strike, azimuth, and dip data to generate geotechnical stereonets directly in the Deswik.CAD design space
 - Supports Schmidt, Wulff, Rose and observation diagrams
- » Underground tabular design toolbox
 - Design toolbox developed specifically for repetitive underground designs in tabular style deposits
 - Generates development layouts relative to defined geological models
- » As-built reconciliation
 - Detailed reconciliation between as-built and design solids from a 3D perspective for development or stopes
 - Report out dilution, overbreak and underbreak from hanging wall, footwall, sides, crowns and toes
- » Advanced resource leveling
 - Access to features such as backwards pass leveling, multi-field or sink rate targeting and time usage models
 - Short-term manual scheduling via interactive resource paths or import resource paths from other packages
- » Tunnels by variable sections
 - Tunnel creation tool that uses chainage based rules to allow a tunnel to have variable profiles
 - Different rule sets available: Primary X-section rule, Secondary X-section rule, Excavation rules



Deswik.UGDB

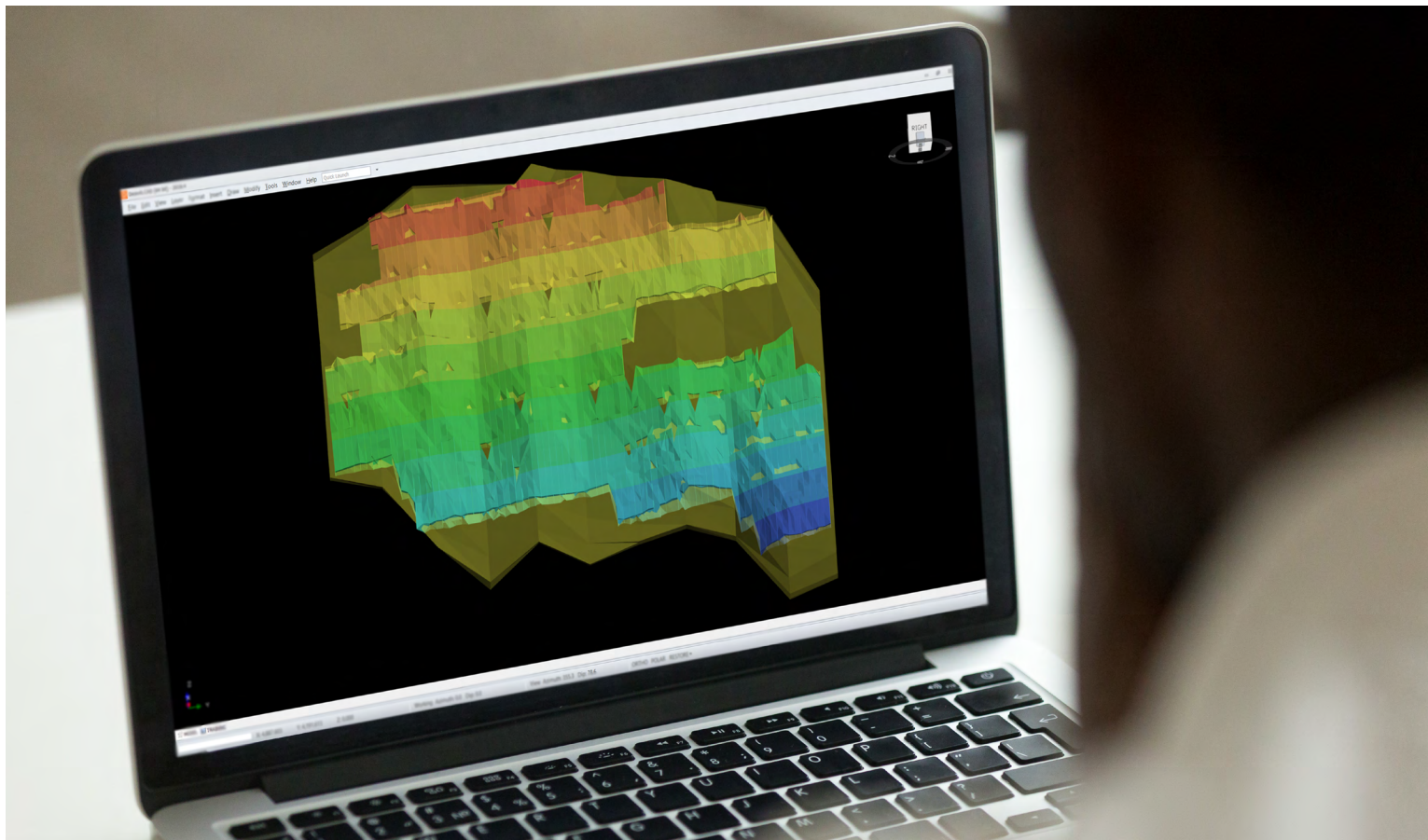
Fast, efficient drill and blast design for underground mining methods

- » Intuitive manual or automatic layout of drillholes with relation to design and existing voids
- » Set design parameters for parallel or fanned holes including fixed toe spacing, collar spacing or angle changes
- » Use set templates to rapidly insert a winze adjusted to dip and length, and charge the holes
- » Update holes layouts against survey and design changes, change the drill rig or reverse the drill look direction
- » Define charge holes and primer locations including customizable decking layouts with multiple explosive products
- » Set blast timing for holes in various patterns and sequences and animate the resultant blast
- » Slice the original stope solid against ring layout or generate directly from the ring designs
- » Rapidly set up plot templates with tables referencing key design information that updates for each plotted ring design
- » Export to IREDES in Atlas Copco or Sandvik data format and upload the design directly to the drill rig

Deswik.AdvSurvey

Fast, efficient point cloud handling

- » Generate a solid from scans including multiple drives and cross-sections
- » Automatically generate a survey outline on the floor of the drive from the scan data
- » Removes the need for doing manual surveys along the drives to pick up wall outlines and surface features for volume calculation
- » Clean up tool – utilizing user-defined parameters, the tool automatically removes features inside of a scan such as vent bags, cables and pipes, rock bolts so that the solids generation tool can be used to create a clean solid
- » Build pillars from room and pillar mining styles
- » Reconcile an existing stope or development design with an as-built
- » Use intensity values for visualization of structures and comparison with surface scans
- » Import large scan data files from open pit and underground scanners through common file formats and convert to points, surfaces or grids
- » Allow users to control their results
- » Integration with Deswik's mine design, scheduling and data management modules



Deswik.SO

Underground stope shape optimization using the industry leading SSO v2.0

- » Automatically generate highest value stope solids across a wide range of mining method geometries and ore body types, delivering strategic stope designs and pillar location optimization against complex ore bodies
- » Wizard-based setup for rapid definition of stope parameters such as specific design criteria and cut-off values
- » Scenario Manager facilitates comparison of multiple design scenarios with rapid adjustments
- » Export and import scenario settings for rapid setup of new projects and re-evaluation of scenarios against new geological data
- » Embedded in the Deswik.CAD graphics platform for effortless generation of stope wireframes and solids

Deswik.ASD

Automatically create mineable stopes for narrow-vein vertical mining methods

- » Consider geological constraints and incorporate design parameters such as pillar restrictions, dilution factors and cut-off grades
- » Constrain stopes to follow defined lenses in the orebody, accounting for close-spaced multiple lenses
- » Development matching for incremental cost analysis to the extents of the ore body from a central access drive
- » Support multiple input data sources to generate variegated stope designs in different ore zones or geological models
- » Embedded in the Deswik.CAD graphics platform for effortless generation of stope outlines and solids



“Developing more value in underground metals mine planning”

Deswik.Caving

Models flow of rock within the cave Life-Of-Mine to give recovery and dilution forecasts

- » Caving simulation
- » Optimizes production targets at draw points
- » Schedules production for block, panel and sublevel caving
- » Integrates with the Deswik process
- » Generates recovery reports by level, phase, resource classification, draw point, and time
- » Allows for cave propagation within a simulation
- » Allows for fine and alternate particle properties

Deswik.SOT

Realize more value from your resource with an NPV optimized schedule

- » Use heuristics and a unique evolutionary algorithm to optimize the net present value of long-term mine schedules
- » Control and narrow the focus by allocating more time to improving the highest-valued schedules
- » Investigate a range of scenarios with capacity flexing to optimize against varied operational resource capacities
- » Apply fleet-size constraints, as an additional option to traditional production constraints
- » Fix the start date of defined activities such as exploration drilling and understand their impact on the NPV of the operation
- » Add contaminant costs when the concentration passes a specified threshold for a given scheduling period
- » Apply optimized SOT sequences as seed schedules for further Deswik.Sched resource leveling processes

Our industry leading consulting solutions include



Mine planning, design and scheduling



Ongoing engineering and training support



Software implementation and reviews



Equipment selection and optimization



Mine rehabilitation, water analysis and closure



Technical due diligence, peer reviews and audits



Scoping, pre-feasibility and feasibility

