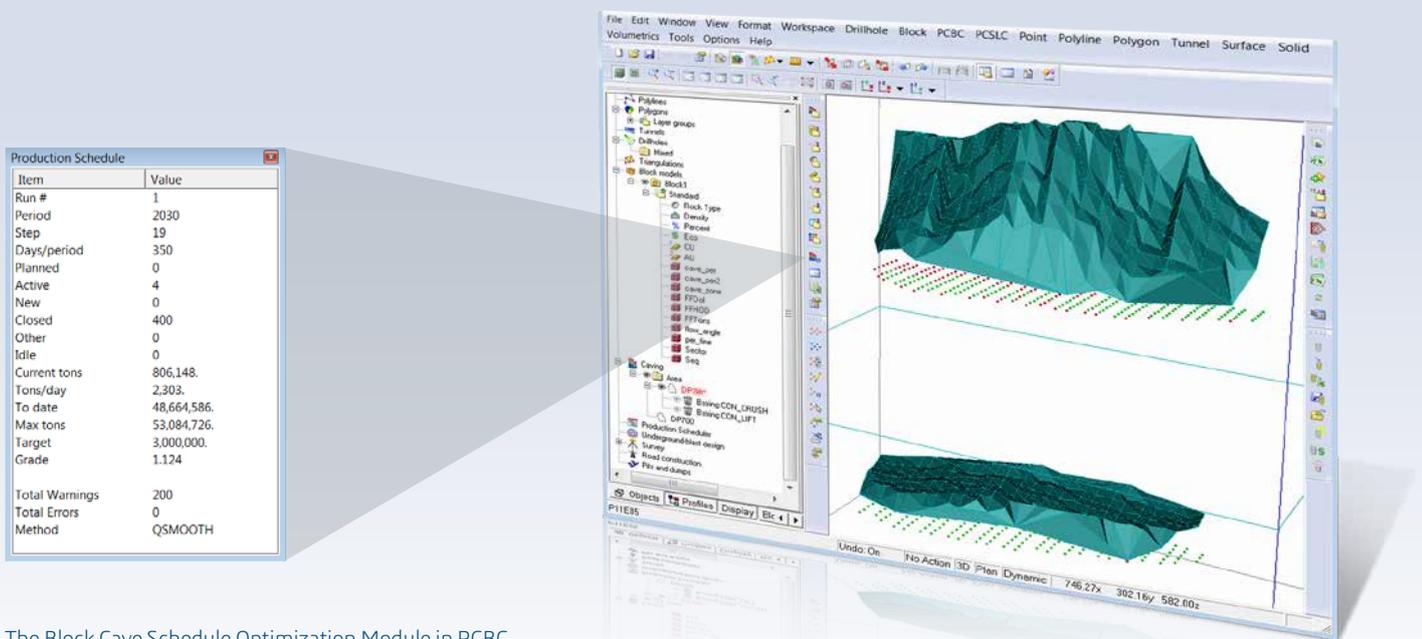# PCBC BLOCK CAVE SCHEDULE OPTIMIZATION MODULE
REALISTIC PRODUCTION SCHEDULES BASED ON OPERATIONAL CONSTRAINTS

The Block Cave Schedule Optimization Module in PCBC.

IMPROVE NPV WITH PRODUCTION SCHEDULES THAT MEET OPERATIONAL AND GRADE CONSTRAINTS

With the Block Cave Schedule Optimization Module (Schedule Optimizer) in GEOVIA PCBC™, users can easily generate a production schedule while simultaneously optimizing NPV. This allows users to improve the value of a project/mine while maintaining a practical mining plan and satisfying complex cave management logic. All of this can be done in an integrated manner in conjunction with the PCBC Scheduler linked with Microsoft Excel.

A realistic production schedule is critical when planning for the production of a mine. The Schedule Optimizer enables users to quickly identify any areas where a production schedule may exceed operational constraints. With this powerful module, users can produce a schedule with an effective balance between operational constraints, project value (NPV) and effective cave management.

OPTIMIZE A PRODUCTION SCHEDULE

Create a more realistic production schedule by applying operational constraints related to the mine's infrastructure such as the capacity of the crusher, ore passes, etc to ensure the schedule doesn't exceed these limits. Users can set up and

manage multiple sets of constraints to allow a project/mine to better maintain the Production Rate Curve (PRC), Mine Sequence, and Opening Rate. With the Schedule Optimizer, users can set up the following constraints:

Tonnage Constraints: Set minimum and maximum tonnages for individual draw points as well as tonnage limits for groups of draw points such as tunnels, ore passes, mining sectors, or entire block cave lifts. Setting these constraints helps manage mining equipment to realistically achieve the production schedule.

Grade Constraints: Set-up grade constraints to ensure that product grades are within given limits, or that contaminant grades do not exceed given thresholds. Lower or upper limits

GOOD MATH

Minimize (with respect to x)

$$f(x) = 1/2x^T Q x + c^T x.$$

Subject to one or more constraints of the form:

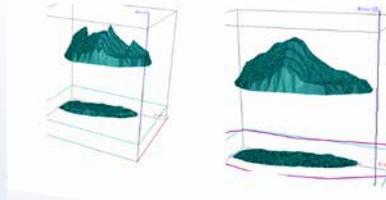$Ax \leq b$ (inequality constraint)

$Ex = d$ (equality constraint)

+

INPUTS AND ENGINEERING JUDGEMENT

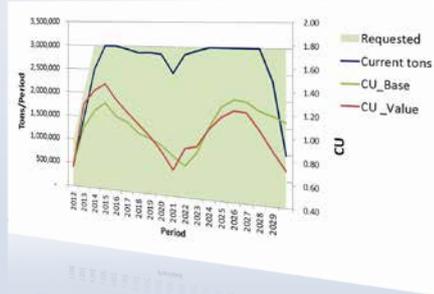*Mining Efficiency* ——o—— *Project Value*

=

PRACTICAL MINING CONSTRAINTS

Left shows cave shape with sector constraints compared to the right which is cave shape control

GOOD RESULTS

Mining Higher grade earlier to improve value

The Block Cave Schedule Optimization Module brings great results.

---

on grades, either ore or contaminant, for all or groups of draw points can be set. Adding these grade constraints to a production schedule provides substaintal improvement of mill feed and plant recovery. In addition, the grade profile from a previous schedule can be used to provide lower and upper constraints for total grade feed.

Equipment Performance Constraints: Set Loader Hour constraints for Load Haul Dump loader (LHD) capacity management using cycle times to ensure the schedule does not exceed LHD capacity.

IMPROVE A PROJECT/MINE'S VALUE

Improve a project/mine's value to ensure the optimal value is reached with the schedule through the following methods:

- Adjust the balance between added value and cave shape effectiveness with **Effective Cave Management** through a user adjustable control between cave shape and value improvement.
- Select higher grade ore at the beginning of production to improve a mine's cash flow through the use of the QVALUE tool, helping increase the mine/project's net present value (NPV), which can **increase a project's NPV by up to 5%**.

- Improve the value of a project/mine by achieving a **balance between tons remaining and the value of the ore remaining** in each draw point.

APPLY AND REPORT ON MULTIPLE CONSTRAINTS

Custom Microsoft Excel reports allow users to easily identify the effectiveness of the different constraints as well as track and analyze those constraints.

Tracking and analyzing constraints in the Schedule Optimizer.

For more information email GEOVIA.PCBC@3ds.com or visit www.3ds.com/GEOVIA/PCBC

Our 3DEXPERIENCE® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3D**EXPERIENCE® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 190,000 customers of all sizes in all industries in more than 140 countries. For more information, visit **www.3ds.com**.

3DEXPERIENCE®