Extended Burden Relief Analysis in 2DBench

A Brief How-To

The Burden Relief analysis in 2DBench has been extended with new options to include the quantity of explosives in the holes in the calculation, and to display the results in a linked graph.

1. Start the Burden Relief analysis as before:
    - mark the holes that are fully relieved,
    - turn on the Monte Carlo option and set the number of runs,
    - set the Scatter Multiplication Factors
    - activate the analysis on the Burden Relief tab,
    - enter values for the number of charges, distance and time interval.

2. Enter an amount for the minimum amount of charge in the tested holes. This can be either a total amount of charge in all holes, or an amount per hole.

    A charge is a contiguous column of explosives that is detonated by a single delay. The charge can be composed of different decks of explosives (e.g. a toe charge and a main charge), with at least one delay somewhere in the charge. For multiple delays in one charge, the detonation time of the charge is taken from the first delay to fire.

    When the blast is fired, each charge is analysed at the time it fires to check if there are at least the number of charges required within the burden distance that detonate before the analysed charge by at least the time interval specified. Any holes that satisfy the criteria can now also be checked for a sufficient quantity of explosives, either as a total mass or per charge. This is based on the premise that if there is insufficient charge, then the burden in front of the checked holes will not move successfully, and thus will leave an excessive burden for the analysed hole to move – hence, it will fail.

    To run the analysis as before, without a check of charge mass, enter zero (0) in the Amount field.

3. There is also an option to include or exclude charges within the same hole. This depends on the mechanism of rock movement in the blast. In some blasts, holes may contain separate charges, where an upper deck may fire before a lower deck or vice versa. Depending on the size of the charges and the rock mass properties, these charges may or may not be intended to provide relief for other charges in the same hole – they could be placed merely to assist in breakage of a specific formation without providing an actual movement. Since the distance between charges in the same hole could be significantly less than between charges in different holes, charges in the same hole could produce a very different result in the analysis. Check or uncheck this option depending on the specific circumstances of the blast.

4. Run the simulation as before, and view the results.

5. The display of the success values on the blast holes is the same as before – the holes will be coloured according to the legend. Open the query and select a hole to view the detailed quantities and success values for a each charge in the hole.

6. Also as before, with the query open, place the cursor on a hole, turn on the anchor, and then move the cursor to the surrounding holes to see the distance between collars and the time differences between charges.

7. To view the graph, click the [Burden Relief] icon on the toolbar.
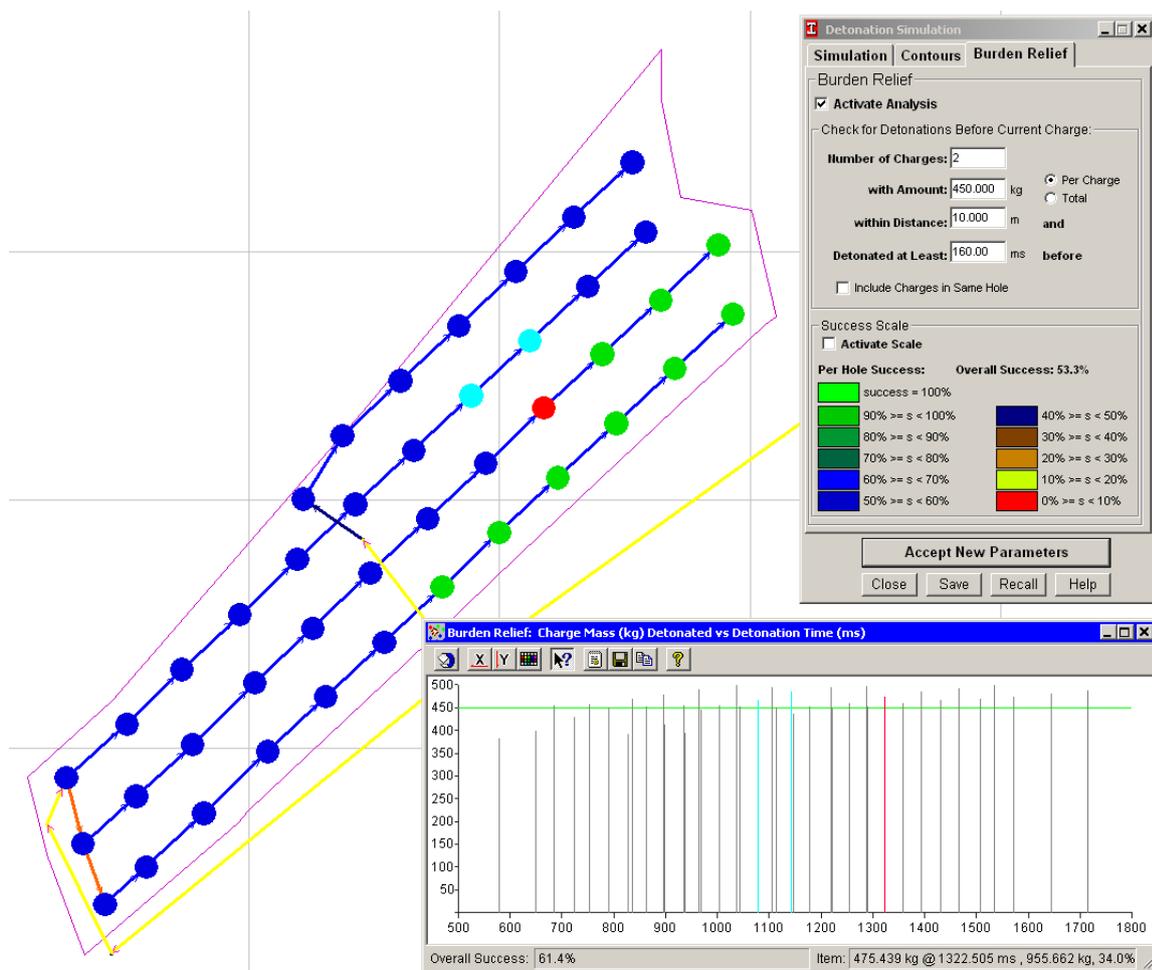
8. The graph is similar in function to the Maximum Instantaneous Charge graph. It shows a bar for each charge in the blast, with the mass of charge on the Y-axis and the detonation time on the X-axis.

    To link the bars to the blast holes, click the query button on the graph toolbar, then click a bar – the linked hole will be shown in red, the holes that detonated before (to the left on the graph) are shown in blue, and the holes that detonate after are shown in green. Any holes and the linked bars that contribute to the analysis for that hole are shown in turquoise (these holes are part of the before / blue holes).

9. The format of the axes and the colours of holes and bars can be changed, and the graph image and data can be copied or saved to a file.