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INSTRUCTIONS FOR CREATING A STEP-BY-STEP PIT DESIGN IN MINING ENTERPRISES

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Abstract
One of the main problems of open-pit mining is the efficient use of freight transportation (freight turnover) and transportation fleet. for maximum efficiency and minimum costs, after extracting minerals, we need to transport them to areas as close as possible to the mining enterprise's border area. Shovels and trucks are the most common are widely used loading and transportation equipment in open pit mining around the world. The the problem is difficult because the truck and shovel systems are complicated by uncertainties related to truck and shovel operations and numerous parameters and as a result problem-related interactions should be considered. This paper develops and implements a stochastic discrete-event simulation model to design and analyze the behavior of a truck and shovel handling system. The boundary area of the mine along with short-term plans, guidelines for open pit mining were given. This model simulates a complex system of trucks and shovels and takes into account the uncertainties associated with the operation of trucks and shovels. This ensures that operating plans are consistent with net present value and ensures that the planning stage is more perfect. Two main subproblems are addressed in this study. First of all, equipment a selection problem in which the number of trucks and shovels is determined. In the second subproblem, key performance indicators using the resources identified in the previous step truck and shovel system is evaluated. Optimal short-term production at both stages the table is the main input in the model. Developed using the proposed simulation model simulation software and it is applied in a real open pit iron ore mine. Several research processes for location planning of mining enterprises are presented as examples.

Keywords: Open pit mining, mine design and planning, the boundary area of the mine, Deep forming parameters, mineral transport distance,

Introduction

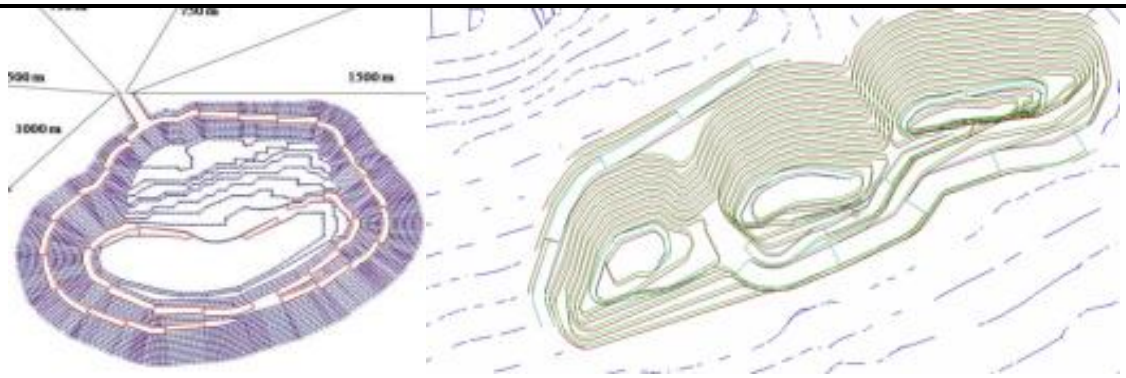
In mining operations, the pit design module allows the engineer to quickly design and plan multiple pits. Mining enterprises we use multiple models to access the design view and separate the designs into different folders. Several designs can be loaded into memory at the same time and they can be saved together as a new design. The user can load multiple pits and switch the one being developed by selecting one of them,

when creating an active design, the dimensions of the area occupied by the mining enterprise are depicted on a large scale. The module uses workspaces to store pit design parameters and design lines. Using deep design two workplaces, one to hold the lines that belong to a particular design, and the other includes all design parameters for any number of pit structures stored in it and in mining enterprises attached to the working area. Once these are created, the pit designer can start using the application design toolbar and based on how they design their pits, and as a result you use the tools in the Polyline menu, in the process of creating a pit design, extensive sizing is carried out.

Below is a typical workflow for mining companies:

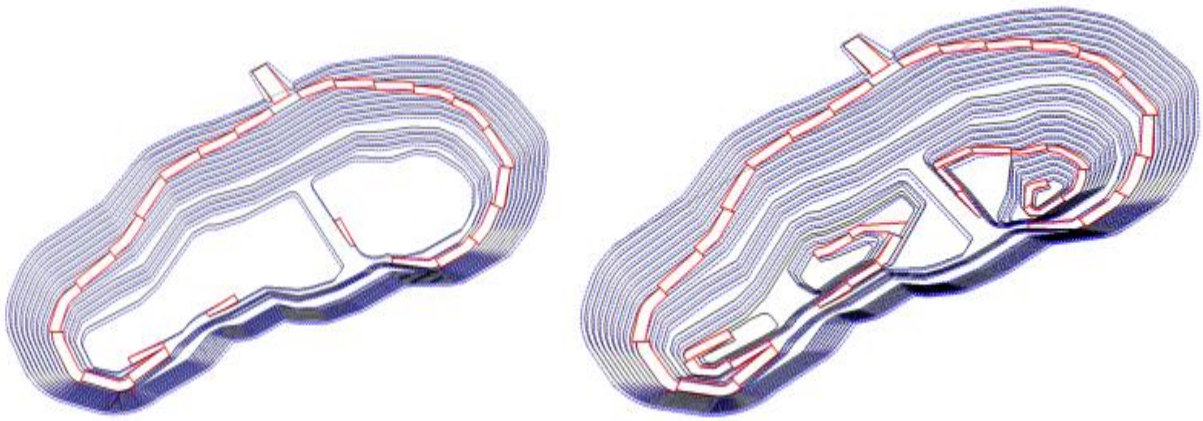
1. To select the current bench and its further mining, it is necessary to draw up a mine border area scheme.
2. It will be necessary to create a line drawing of the design. This allows the user to digitize the line of the field boundary mining enterprise if step 1 is the top of a bench, it creates a top line. The user must change the line type of the digitized slot line after switching to the profile state of the selected "hive" line type, the parameters of the mining company are entered.
3. The length of the mine from the boundary of the actual mine area to the boundary of the non-operational area and the slope of the mine are entered, similar to the actual contour.
4. When designing the boundary of the mining enterprise, it is necessary to move the lines up (if the active line is a peak, down) to the next bench.
5. It is necessary to check for errors in the projection and choose the closest distance of the mine to the mineral.
6. Before reprojection, the mine is attached to the new lines of the boundary field.

The proposed simulation model was developed in the Tebin Bulak open-pit iron ore mine of the Republic of Uzbekistan. In the studied mine, a large pit with a unique exit point began to form. By now, blasting processes are being carried out in the mine and are being transported to the pit exit point via two ramps before being sent to the destinations. Tebin Bulak it is planned to build five different directions at the mine: two landfills, two warehouses and two processing plants. It is assumed that stock 1 feeds only crusher 1 and stock 2 only feeds crusher 2. Picture 1. shows the schematic view of the mine and the distances and differences between the exit point from the mine boundary area section and directions as well as processing plants and corresponding distances the distance to the mine border area where the reserves are transported is measured. When fully operational, the mine will have an estimated total capacity of approximately 2.2 million tons per month. The processing capacity in the reserves is independent of the mining capacity. Top and bottom limits on monthly material delivered to each crusher can vary between 0.35 million tons and 0.5 million per month. There is no limit to the capacity of stocks and waste landfills are established. The main element of interest in the deposit is iron, for which magnetic recovery is measured, and phosphorus and sulfur are contaminants. Upper and lower limits listed by types of elements in processing plants and stocks. Rocks delivered to class boundaries for materials delivered to landfills. It is estimated that only 1 truckload can be spilled the time regime of each of the processing plants or each of the stocks should be calculated at the same time.



Picture 1. Creating equal pits at the closest distance to the mineral in open-pit mining enterprises.

In the Tebin Bulak iron mine, the magnetic separation device works continuously, that is, the material flows through the belt crushing and separation steps are carried out simultaneously. However, the idea is to use batches that are representative of the material are performed at specified time intervals as objects in a discrete simulation model. Each object moves forward and average characteristics of the material it provides (grades, particle size distribution, etc.). hardness of rocks), as well as its tonnage are placed at close distances. All mineral processing plants should have some storage areas as storage bins or reserves for 4-5 days. These stocks/storage bins are used to store material at various stages and the processing plant will need to be continuously operated to avoid unexpected shutdown of the entire plant. In addition, the presence stockpiles/storage bins ensure continued material flow in downstream processes when for any reason the high current will be shut off in a short time. These can be storage boxes are shock absorbers of processes. When a facility reaches a storage module, its tonnage is added to the storage module and tonnage and the object is disposed of. Average to monitor the level of material in each box the weighing method is used, which means that the material is mixed in each container and not the input batches. In the mine can be recognized among the outputs. The material content of the storage is updated each time an object reaches the warehouse or a new object is created to indicate the feed for further processing. A group consisting of employees of the Nukus Mining Institute of the Navoi State University of Mining and Technology, Dzhaksimuratov.K., Karamov.A., Allanazarov.B., Jumabayeva.G., O'telbayev.A observed blasting operations in the mine during a trip to the Tebin Bulak iron mine. During the research, 521 detonators were detonated in the Tebin Bulak iron mine. We watched the detonation process from 1.5 km. After the explosion, dust rose and spread over a long distance. Otelbayev Azizbek, a student of the Nukus Mining Institute, has been conducting extensive research on open-pit mining processes, technologies used in mining enterprises, and mining activities. Azizbek has a high level of interest in the processes of mining enterprises. Many of his articles have been published in international journals.



Picture 2. 3D drawing of the model of the mining enterprise with attached dimensions, preparation of the model and drawing of the schematic view of the mine.

Conclusion

Decision making in mining operations is a difficult task. Competitive market and growth requirements for mining enterprises to increase their productivity and many decisions can be made to improve efficiency. Automation is the solution everyone is looking for. Increasing computing power and technology has already set the stage for system automation. Truck dispatch systems are today, most of the high-yielding mines are making attempts at automation. But in these systems there is no connection between strategic and tactical plans. This article attempts to do so creating a bridge between the short-term production plan and the tactical plan by completing the higher task the two-stage dispatching algorithm provides instructions on the implementation of stages and the planning of the location of the mine. The proposed model of mining machine includes shovels and specifies the available faces and their target production presented in the short-term production plan. The target is then given to the truck dispatch system to achieve in real-time operations. The main contribution of this paper is the mine planning model, which acts as a two-stage upper stage and based on the dispatch algorithm, the border area of the mine, the transportation distance of minerals are considered. Improvements over previous research in this area using operations research methods include: linking the short-term production plan with operations (tactical plans), including shovel assignments and considering multiple target mining systems. Future research in this area involves evaluating the optimization model with simulation and is known period of time (about a year). Integration with the simulation model provides real-time a schematic view of the mine is described on the basis of system monitoring, which monitors and optimizes the system state when it changes.

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