



Technical Article

## **A Procedure for the Calculation of Surge Bin Sizes**

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A surge bin between two machines in series has the effect of increasing the total capacity of the system. In the present paper this effect is related to the machines' rates average production and interruption periods and internal availabilities. A procedure has been developed which calculates the total capacity as a function of these parameters and of the live volume of the intermediate surge bin. This procedure substitutes the rule of thumb of "so and so many hours of surge" and provides the engineer with a tool for finding appropriate dimensions of surge bins.

The transporting machinery in the mineral industry is characterized by a rather high degree of variability. The machines' physical availabilities are low compared with those of other industries. This is due to the impact of the ore which causes high wear and frequent breakdowns. The flow rate of the ore is variable due to its physical properties in combination with the capability of the machinery to deliver and to receive the ore as it moves from one machine to the next.

Surge bins and piles in an ore production and transportation system have the function of separating machines in series by means of volumes which are filled and emptied, and which thus protect the machines in series from each others' breakdowns and flow rate variations.

In an ore production and transportation system there are typically 3-5 locations where surge bins or piles are installed between machines or machine systems from the mining front through to the expedition of the final product to the customer. In an underground operation there are orepasses between the production levels and the haulage level (Fig. 1 ). These orepasses, apart from conducting the ore also act as surge bins. If the ore is hoisted by skip it would be crushed and held in a surge bin waiting to be fed into the measuring bin before the skip. At the top of the skip hoist a surge bin would hold the ore before it is fed to the further processing. If the ore is hoisted in cars, the tracks on the haulage level ahead of the hoist and the cars would together act as a surge. On the surface the cars would be dumped into bins holding the ore before further processing. In an open pit mine operated by shovels and trucks there might be a surge pile ahead of the crusher and a bin under the crusher holding the ore which is then fed to screening and secondary crushing and possibly to further screening and tertiary crushing (Fig. 2). Between these steps there would be surge bins.