

Improvement of crushing plant cleaning operations

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CHALLENGE CONTEXT

Antucoya Mine carries out a weekly cleaning of the crushing plant to prepare for maintenance. Ninety per cent of the cleaning of the plant equipment is done manually, which results in limited process efficiency and exposes people to the various risks associated with the tasks. Because of the manually-intensive tasks, cleaning requires a 3.5 to 5 hour interruption before the plant can be in the condition required to start maintenance activities.

Performing these preparations in the current way, the cleaning process needs to be optimised in terms of time and form. For this reason, an alternative solution is being sought.

WHEN THE PROBLEM OCCURS

The problem occurs at 3 critical points in the plant:

1. Grizzly screeners on lines 1 and 2 of the primary crusher.
2. Transfer chutes and crushing chambers of the secondary and tertiary lines.
3. Agglomerate and stockpile transfers.

CONSEQUENCES

In the case of screeners, the material embedded in the bars forces the operator to apply a high amount of physical effort, resulting in limited efficiency due to human capacity.

In the case of the chutes, there is a low efficiency due to the amount of equipment to intervene and the limited number of workers.

For agglomeration and stockpile transfers, there is a high dependence on hydroblasting equipment, which is affected by the reliability of the equipment and other factors directly related to the task.

PROVEN TECHNOLOGIES

- Stationary hydrojet equipment was tested in transfer 12 - 13 without success due to the pressure capacity of the equipment tested (2000 psi)
- Compressed air was tested
- Rock breakers have been tested on the screeners

OBJECTIVES AND SCOPE

The objective is to use tools and/or equipment to provide an effective and safe solution for cleaning the three critical points of the crushing plant: Grizzly screeners, transfer chutes and crushing chambers, and agglomerate and pile transfers.

The solution must be able to reduce cleaning time and comply with the standard.

SOLUTIONS REQUIREMENTS

1. Must be adapted to the space and operational conditions of the crushing plant.
2. Must be capable of performing the cleaning task in less than 3.5 hours:
 - 2.1 Grizzly screeners cleaning : 45 min to 25 min.
 - 2.2 Cleaning of transfer chutes : 2 hrs to 1 hr.
 - 2.3 Cleaning of agglomerate and stockpile transfers: 1 hr to 30 min.
3. Must reduce the safety risks for the operators carrying out the work.
4. Low interference to existing facilities should be considered.
5. Operation, maintenance and calibration should be of low complexity.
6. Solutions with a TRL ≥ 7 (system prototype demonstration in a operational environment) are required.

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HOW THE PROBLEM IS CURRENTLY BEING SOLVED

In the cleaning of Grizzly screeners in primary crushing, the material is embedded in the bars, forcing the operator to make a high physical effort, which generates a limited efficiency associated with human capacity.



The cleaning of the transfer chutes and crusher chambers is done manually using material dragging tools and is carried out sequentially in the different transfers of the lines from the feed to the screeners to the crusher chamber. This cleaning activity presents an important challenge in its efficiency, due to the amount of equipment to intervene and the limited number of workers available.



Lastly, a pressure hydroblasting equipment is used to clean the agglomerate and stockpile transfers, ensuring the cleanliness of the transfers. Despite the effectiveness and efficiency of this equipment, it is necessary to identify an improvement to automate the cleaning of the transfers, thus allowing the use of the hydroblasting in other cleaning activities.



EXCLUDED SOLUTIONS

Engineering studies, consulting and/or advisory services are excluded.

ANNEXES

Material characterization:

- Granulometry of product : 86.5 % - 1/2", 92 % - 3/4"
- Mineral moisture from mine = 1%.
- Mineral moisture coming out of agglomerate = 8%.
- Ore flow = 5700 tph.

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ANTOFAGASTA MINERALS CHALLENGE - ANTUCOYA MINE

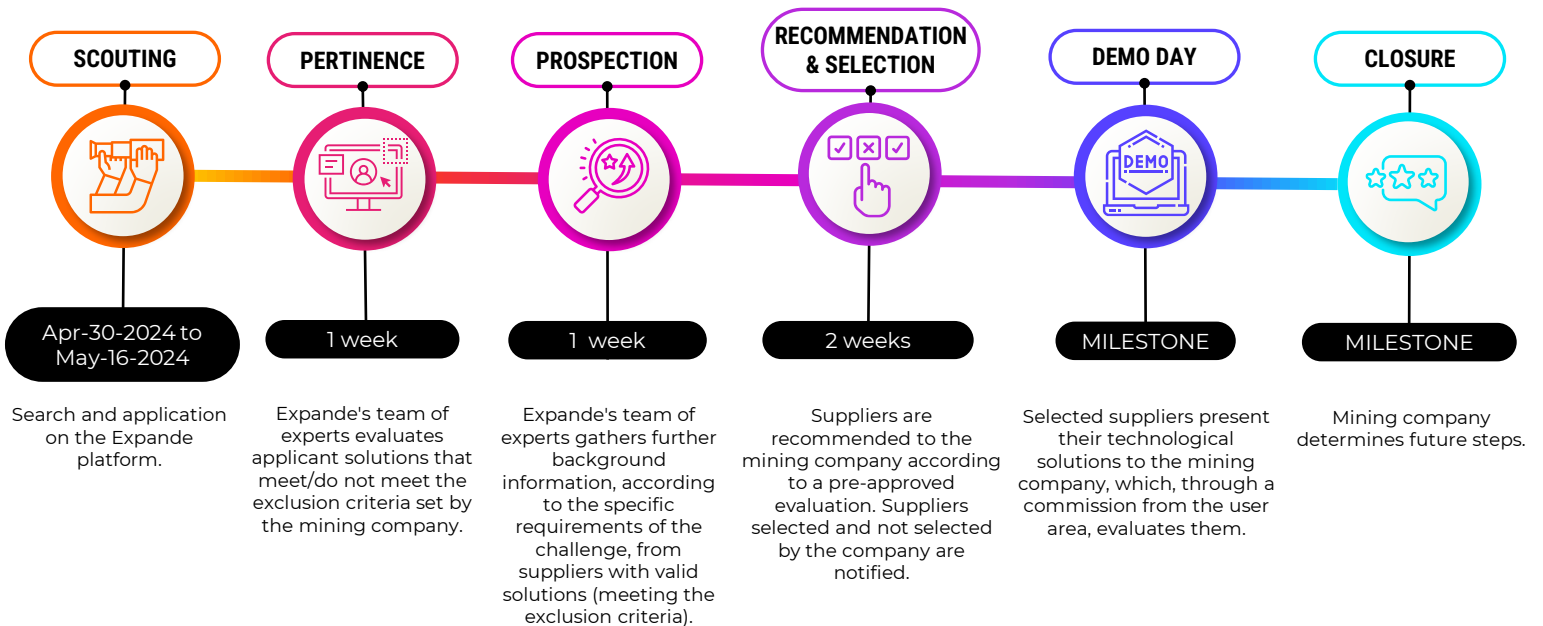
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STAGE TIMELINE



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