

Challenging Tailormade Solutions, Implementing New Conveying Equipment into Existing Systems

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Abstract



If a new process equipment is added to an existing plant, there are several restrictions for the installation and commissioning of the equipment. Firstly, the process parameters need to be identified and verified by modelling and upscaling. Sometimes this is exceeding the known limits and pretesting of the real equipment is needed. Especially for installations in the potroom, a real scale model of a new installation is beneficial to verify the installation and process limitations. When it is necessary to explore new materials or new process steps, a pretest in industrial scale is needed. In this paper an example for such a pretest and its evaluation is given. The effects of the different material parameters on handling and storage are outlined.

Keywords: Alumina handling, Storage, Pilot test, 3D-scan

1. Introduction

When new equipment is added to an existing plant, there are several boundary conditions that need to be considered. The existing installation might need to be disassembled or modified with a minimized effort. It could well be that there are no detailed drawings available for all areas. The new equipment must be added to the existing control logic and there might be several space or access restrictions. In regard of accessibility a 3D-scan can help to define the right equipment dimensions. While with new installations the form will follow the function, with modifications often the function must follow the given form, so it could be necessary to stress the process parameters. In this case pilot scale tests could be needed.

In this paper an example study on 3D- scan and pilot testing is explained.

2. Example Study

We took as an example for restrictions in the field, the replacement of a crane feed system with an aerated distribution system.

A standard layout of an aerated distribution system is shown below. But if this is added to an existing plant, there are several boundary conditions that need to be considered. Fig. 1 shows a sketch of the function of the system. The transport to the intermediate bins as well as to the prebins of the reduction cells is realized by means of special aeroslides with an inclination of approximately 1°, which are aerated section-wise in a controlled manner. The system is self-controlling and automated and does not use any mechanical valves opening and closing inside the abrasive alumina.

The control system for the aerated distribution system (ADS) is divided into two levels: Level 1 comprises the transport aeroslides from the alumina silo to the buffer silos in front of the pot superstructures. Level 2 includes the aeroslides from the buffer silos to the prebins on the

electrolysis cells. Because of the intermediate buffer silos these levels are independent, both system and control-wise, i.e., transport and distribution from the alumina silo to the buffer silos are decoupled from the pot feeding. For more details about ADS see [1, 2].

Main design data of the typical plant are:

- Transport capacity of each distribution aeroslide: 50 t/h, inclination 1°.
- Transport capacity of each cell aeroslide: 10 t/h; aeroslide inclination: 0.5°.
- All pot operation is monitored by the control system via level switches giving the operator the full control of the system and feedback of the status of each particular cell.

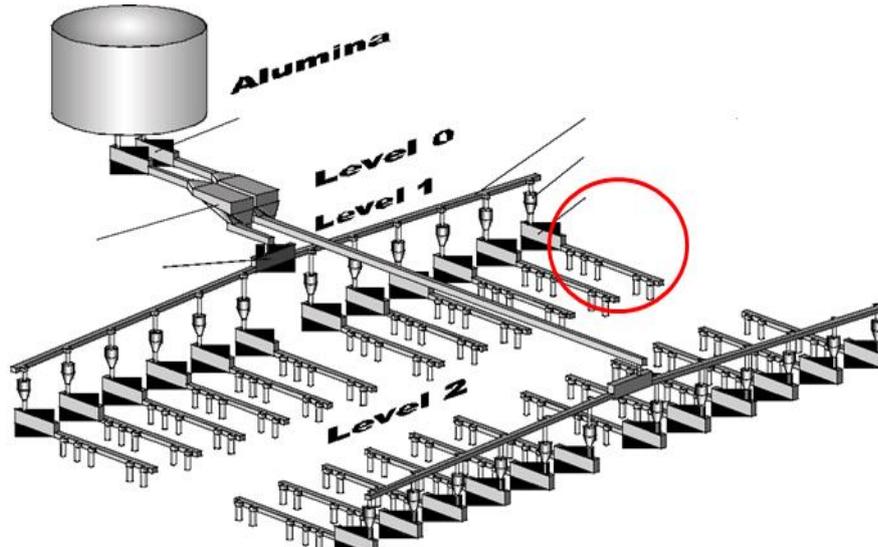


Figure 1. Example of Aerated Distribution System.

When the crane and the PTM remains unchanged and the crane feed system must be in place because the modification must take place with all the equipment in operation, there is only very limited space available for a new Aerated Distribution System. The sketch in Figure 2 shows an example; the feed system is nearly submerged in the superstructure.

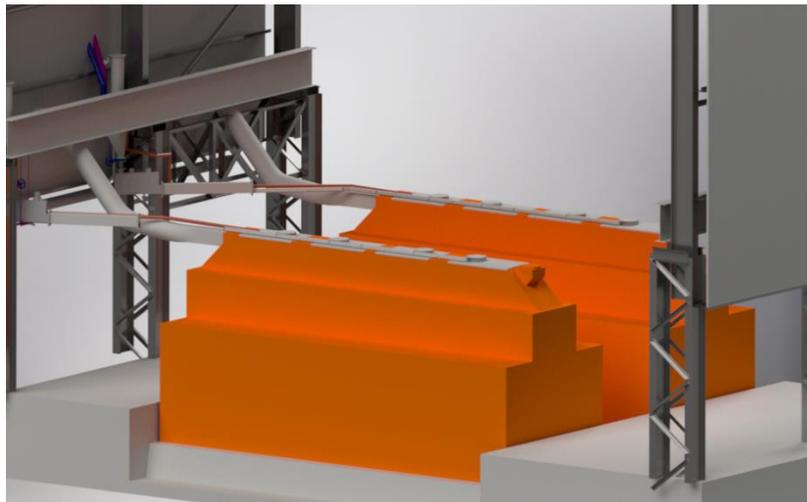


Figure 2. Example of new pot room feeding.

As at the pot all the available systems still need to be accessible, the space only allows for a very small system and a very limited space. That means the aeroslide can only go horizontally without

From the given data, a small pilot test was done to verify the process data. The pilot test showed in this case the feasibility of a minimised version of an aerated distribution system.

7. References

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