

Flotation circuit stability at an industrial base metals plant using the Mintek's FloatStar Level Stabiliser control system

by

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ABSTRACT

The client requested that Mintek commission the FloatStar Level Stabiliser system on their Lead and Zinc flotation circuits. FloatStar Level Stabiliser (FSLs) is an advanced level control module designed specifically for flotation cells. Unlike conventional PID controllers, it accounts for interactions between the cells in a bank and moves all the associated valves simultaneously. This enables it to reject disturbances quickly whilst ensuring fast setpoint tracking.

For the Lead (Pb) flotation circuit, the FloatStar control system increased the mineral recovery by 0.51% while the concentrate grade was within its desired economical level. Similarly, when the FloatStar control system was activated on the Zinc (Zn) flotation circuit, a recovery improvement of 0.12% was observed with the mineral grade within acceptable economical levels.

PERFORMANCE DATA AND DISCUSSION

Performance tests

The FloatStar ON/OFF test campaign was conducted for a period of 2 weeks to determine the plant metallurgical performance (i.e. the overall plant mineral recovery and concentrate grade of Pb and Zn) attained by each of these controllers (FloatStar ON and FloatStar OFF). For a fair comparison between these controllers, it was required that at least the plant feed grades and product grades are approximately the same since the metallurgical performance is highly dependent on these grades. The campaign involved switching between the controllers daily to produce two sets of data (FloatStar ON and FloatStar OFF) on the basis of metallurgical performance, and evaluating the performance of each set. According to the plant personnel, due to less variability in the feed grades, a daily interval was used in switching between the two controllers.

The results from the performance campaign are shown in Figure 1 (for Pb flotation) and Figure 2 (for Zn flotation). Mineral recovery improvements of 0.51% and 0.12% on Pb and Zn respectively were achieved when the FloatStar Level Stabiliser was activated. The differences in the mineral concentrate grades for Pb/Zn flotation circuit under the FloatStar ON and FloatStar OFF were insignificant and in both cases the mineral grades were within their acceptable economical levels.

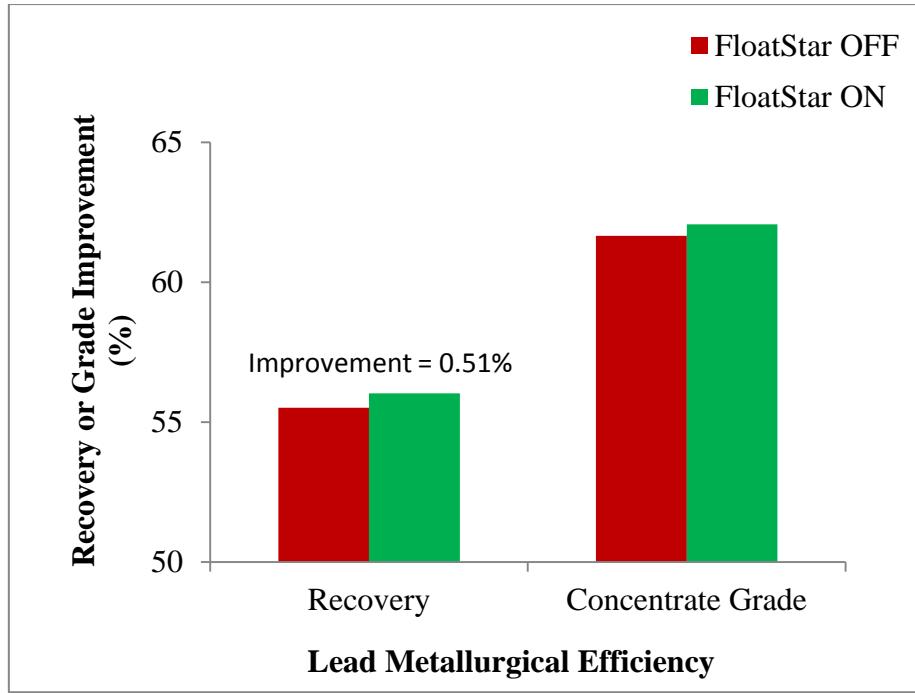


Figure 1: Metallurgical efficiency of Pb flotation

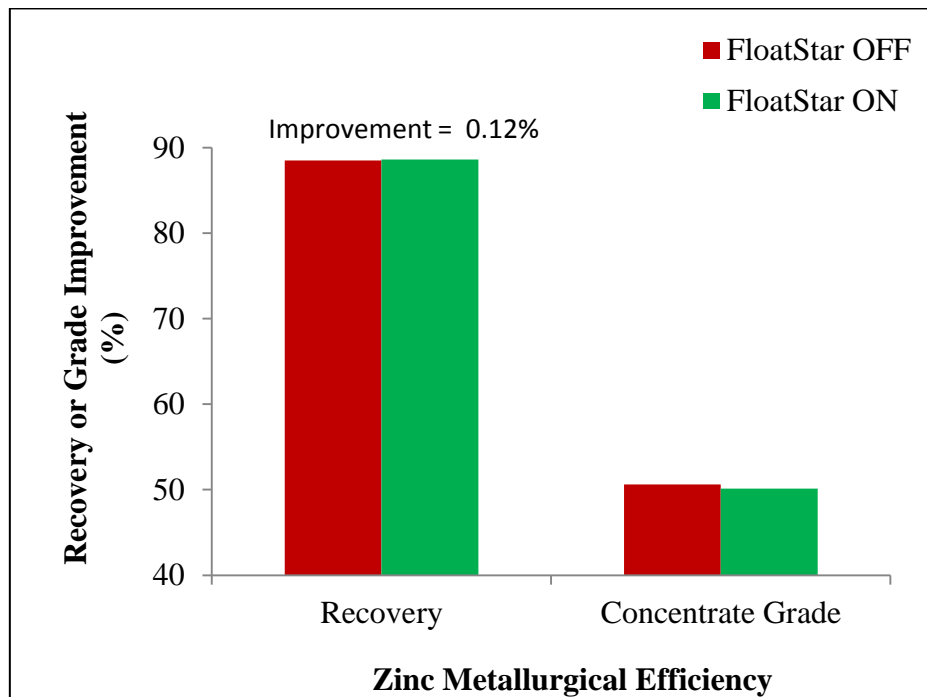


Figure 2: Metallurgical efficiency of Zn flotation

Level Stability

The FSLs (FloatStar ON) performance on the Pb and Zn rougher-scavenger circuits is compared to the DCS-based PID controller (FloatStar OFF) as shown in Figure 3 and Figure 4 respectively.

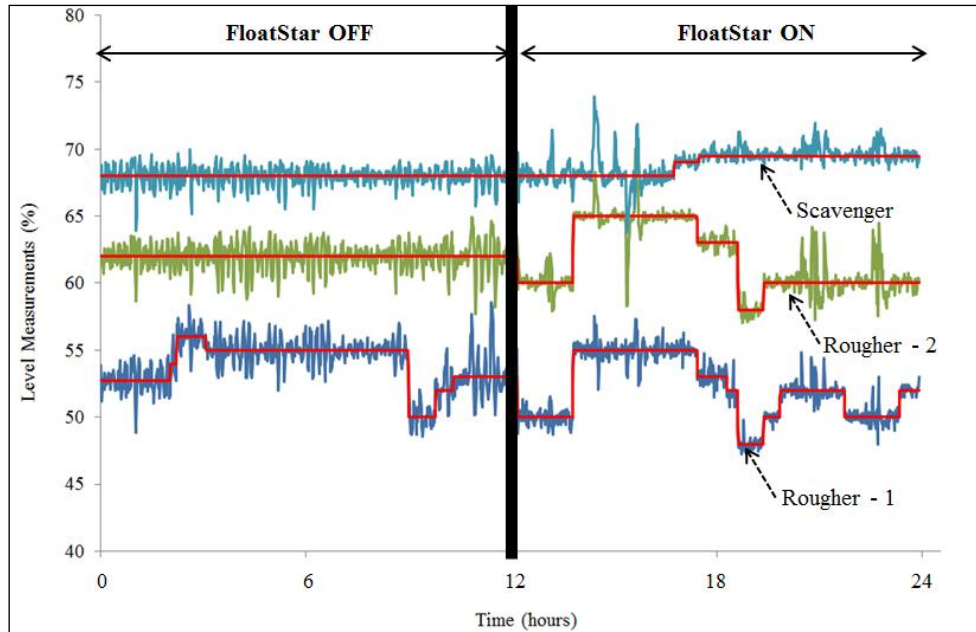


Figure 3: Lead rougher-scavenger cells under FloatStar control and DCS plant control

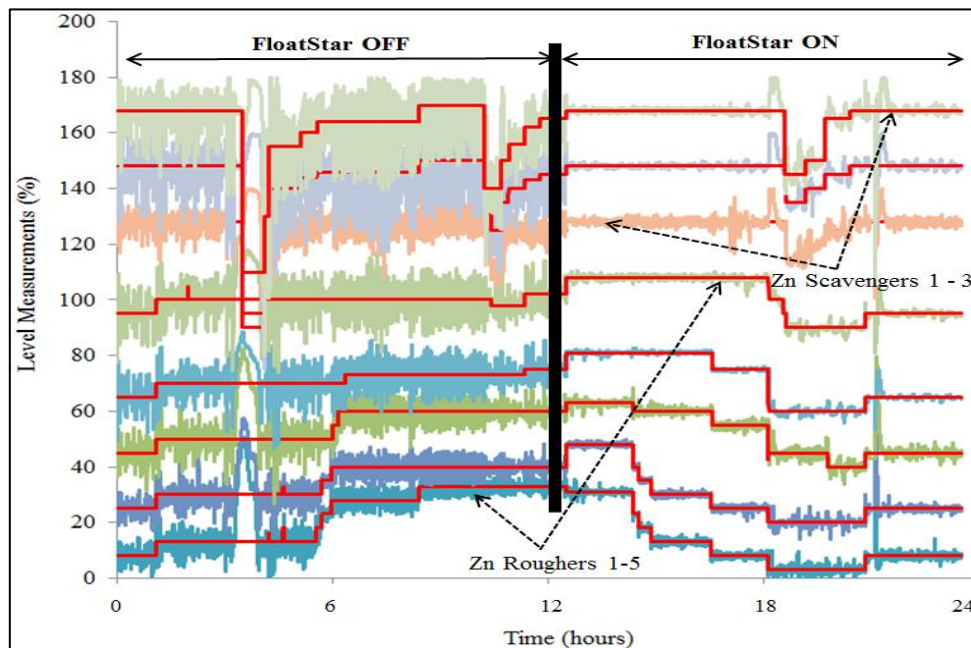


Figure 4: Zinc rougher-scavenger cells under FloatStar control and DCS plant control

CONCLUSIONS

From the data analysis, it was shown that better level stability and faster setpoint tracking was achieved when the FloatStar Level Stabiliser was operational as compared to the existing DCS-based PID controller. From the plant metallurgical performance test campaign, it was found that the FloatStar system attained higher mineral recoveries for both Pb (0.51% improvement) and Zn (0.12% improvement) without compromising the economic value (grade) in the final product.

CLIENT COMMENTS

Comment 1:

“Mintek On-Off test results have been compiled. Our observations:

1. There has been an increase in Lead recovery & Lead concentrate grade from the tests when Mintek was "ON" as compared to when Mintek was "OFF".
2. Zinc recovery has also registered an increase but there is deterioration in Zinc concentrate grade.
3. Minor variation (say +/-0.2 % etc) can be attributable due to heterogeneous nature and mineralogy and need not be linked to FloatStar.”

Comment 2:

“We are very much interested in the optimization project and willing to do the trial of the system for a mutually agreed period. You may please send your proposal for further discussion and consideration with our Unit Management team to take up the matter further.”