



Processing of samples with a wide range of copper grade within one pulverizer

Assessment of the automatic pulverizing mill HP-MA

Abstract

During copper production the quality control laboratory has to deal with samples of varying copper concentration including copper matte and slags. The automatic pulverizing mill HP-MA provides the possibility to process samples with a wide range of Cu-grade. The integrated sand cleaning function of the vibrating mill HP-MA allows the automatic preparation of different sample types on a single machine without the risk of contamination.

Keywords

• copper matte • copper slag • XRF • contamination • automation

Introduction

The HP-MA is successfully used worldwide for process control at various copper plants. The cleaning function with combined sand and compressed air cleaning was found suitable for processing high grade copper matte (~65 % Cu) and different types of slags:

Converter slag	(<7 % Cu)
CuPb slag	(<0.5 % Cu)
Cu slag	(<0.9 % Cu)

This note will present main parameters of sample preparation and show the capability for processing samples with widely varying grades of copper on a single grinding machine.



Fig.1: The automatic mill HP-MA configured for a combined cleaning with sand and compressed air.

- (1) storage for cleaning sand (vol. 1.5 l),
- (2) PLC control panel,
- (3) cup magazine for batch processing

Sample preparation

For the contamination test a sample amount of 50 g was chosen. The copper matte was ground for 90 seconds with 1400 r/min, while slag samples were ground for 60 seconds at the same speed. The CuPb slag was chosen for the contamination test, because this type has the lowest Cu-content. The interposed sand cleaning was performed at lower speed and with duration of 15 seconds. The sand used for cleaning was normal commercial quartz sand. The cleaning was tested with three different amounts of sand: 30 g, 50 g and 70 g. XRF analyses was carried out using an energy dispersive spectrometer and a standardless method. To roughly estimate the degree of contamination for each sample the output loss was determined after milling.

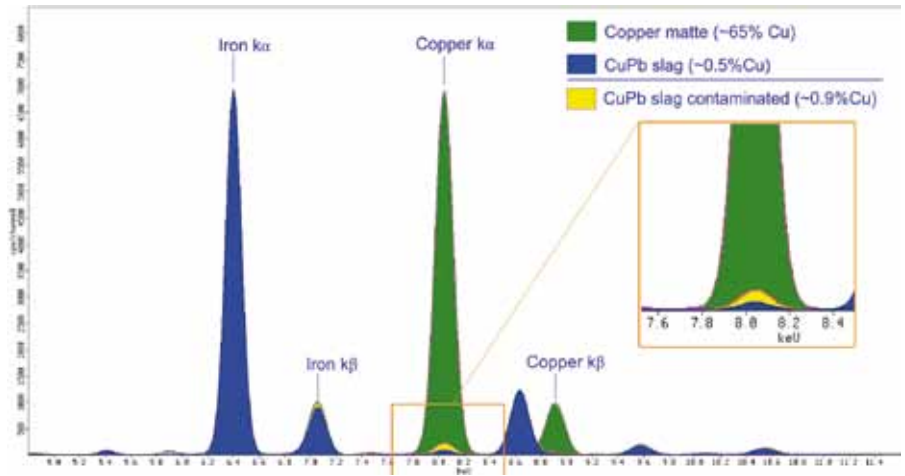


Fig. 2: EDX spectra showing the Cu - peak intensity of the copper matte (green) and the CuPb slag (blue) milled in the same grinding vessel with interposed sand cleaning (test with 30g). The contaminated CuPb slag (yellow) was milled directly after a copper matte sample without sand cleaning. Additionally labeled are the iron peaks.

Results

The loss of output depended on the Cu-content of the sample. Accordingly, copper matte (~65 % Cu) exhibited the biggest loss with about 11 % of the input weight. Among the different slag types, the average loss was highest for the converter slag (3 % loss). A detailed summarization is given in table 1 below.

Sample type	(%)
Copper matte	10.5 %
Cu slag	1.6 %
CuPb slag	2.8 %
Converter slag	2.9 %
Cleaning sand	1.0 %

Tab.1: Average loss of material after mill discharge.

XRF analysis shows that the Cu-content of CuPb slags was below the limit of 0.5 % in all three test scenarios (Tab.2). Picture 2 shows the peak intensity compared to the copper matte and a contaminated sample milled without interposing sand cleaning (30 g). The results clearly revealed that contamination was avoided by using the sand cleaning option in combination with compressed air.

Cleaning sand	CuPb slag (Cu %)
30 g	0.34 %
50 g	0.35 %
70 g	0.44 %

Tab.2: Results of the contamination test, to check the ability of the HP-MA with sand cleaning for copper samples.

Conclusion

The mill HP-MA is able to process different sample types with a wide range of copper grade without significant contamination. The implementation of a blind sample will further minimize the cross contamination. Therefore, the HP-MA is a reliable pulverizing mill for processing copper samples for process control.

More information:



Germany

HERZOG Maschinenfabrik GmbH & Co. KG
 Auf dem Gehren 1
 49086 Osnabrück
 Germany
 Fon +49 541 9 33 20
 Fax +49 541 9 33 232
 info@herzog-maschinenfabrik.de
 www.herzog-maschinenfabrik.de

USA

HERZOG Automation Corp.
 16600 Sprague Road, Suite 400
 Cleveland, Ohio 44130
 USA
 Fon +1 440 891 9777
 Fax +1 440 891 9778
 info@herzogautomation.com
 www.herzogautomation.com

Japan

HERZOG Japan Co., Ltd.
 3-7, Komagome 2-chome
 Toshima-ku
 Tokio 170-0003
 Japan
 Fon +81 3 5907 1771
 Fax +81 3 5907 1770
 info@herzog.co.jp
 www.herzog.co.jp

China

HERZOG (Shanghai) Automation Equipment Co., Ltd.
 Section A2,2/F, Building 6,
 No.473, West Fute 1st Road,
 Waigaoqiao F.T.Z, Shanghai, 200131,
 P.R. China
 Fon +86 21 50375915
 Fax +86 21 50375713
 MP +86 15 80 07 50 53 3
 xc.zeng@herzog-automation.com.cn
 www.herzog-automation.com.cn