



Design and Manufacturing of Modified Column Flotation Cell (3PC)

R. Atash-Dehghan

R&D Division, Sarcheshmeh Copper Complex, Rafsanjan, Iran

M. Kolahdoozan

Assistant Professor, Dept. of Mining Eng., University of Tehran, Iran

A. H. Koohsari

Assistant Professor, Dept. of Mining Eng., University of Yazd, Iran

ABSTRACT

To study the effect of froth drop back (FDB) on copper concentrate grade a column with special shape in washing zone was designed and manufactured in Sarcheshmeh copper complex of Iran. The column's height is 500 cm with the diameter of 6 cm. The three product column (3PC) is made of plexyglass material with a special elbow. This column has shown to yield, clean, high-grade concentrates because it separates the froth-rejected particles (drop-back or third product) selectively and uses two washing water entrances. This column is suitable to study J_w , J_B , FDB and wash water addition point in conventional flotation columns. This cell showed promising results in terms of enrichment ratio as a copper cleaner. Also copper concentrate grade of 23.5% was achieved.

Key words: Flotation Columns, 3PC Column Flotation Cell, Froth Drop Back, Sarcheshmeh Copper Complex

INTRODUCTION

Separation of minerals and concentrating valuable minerals from their ores is at the heart of mineral processing. Column flotation is today a subject of great interest in mineral processing with steadily growing research and industrial application. A flotation column is shown schematically in Figure 1. Commercial column flotation units are typically 9-15 m in height and 0.5-3.0 m in diameter. Major advantages of columns include low capital and operating costs, better adaptability to automatic control and improved metallurgical performance.

The column consists of two zones. A collection zone that has the objective of attaching hydrophobic particles to bubbles, and the other is froth or cleaning zone responsible for carrying capacity and froth enrichment. Due to the froth cleaning action carried out by wash-water in the froth zone above the pulp-froth interface, some drained materials from the froth return to the collection zone.

The dropped back material from the froth returns to the collection zone, goes back to froth, in cycles, remains at the pulp-froth interface and exits the column randomly. A flotation column has been modified to improve mass transfer rates and collection capacity (Rubio, 1996). This cell separates off the drained particles from the froth zone (third product) and uses a secondary wash