Contribution to the previous paper

by G. L. C. YOUNG*

The first full-scale Reichert cone concentrating plant to be erected at a large South African gold mine was at President Steyn Gold Mining Company, Welkom. This plant was installed as a part of the run-of-mine mill extension of 150 000 t per month that was commissioned in 1976–1977.

In spite of considerable efforts on the part of the mine personnel and the supplier, it was found that the installation could not be maintained as a satisfactory operating unit. In addition to requiring very high maintenance, it was found that the recovery of concentrates fell far below that achieved by the drum and endless-belt concentrators both at President Steyn and at neighbouring mines. Subsequent laboratory tests indicated that the particular ore milled by this section of the plant showed no significant differences in respect of gravity concentration from other local ores.

Reichert concentrators were found to have the following shortcomings when applied to Witwatersrand-type gold ores.

(1) There was a rapid accumulation of minute particles of tramp steel, in spite of a large vibrating screen ahead of the cones. Various screening surfaces were tested, ranging from slotted apertures to 4 mm and 2 mm square-opening polyurethane modules. Fine steel, oxidized pyrite, and carbonates accumulated both on the wetted surfaces and on the undersides of the feed-distributor cones. These latter accumulations were particularly severe and trapped large quantities of rich concentrate, which represented a serious hazard not only from the security angle but also the structural integrity of the concentrators. The adherence of deposits was such that the surfaces could be cleansed only by the application of concentrated acid. The accumulations on the underside of the distributor cones could be removed only by dismantling the system, a tedious procedure requiring strict security precautions.

(2) The original configuration comprised three double/single cones but, because of the extreme difficulty in clearing the concentration slots, it was found necessary to convert the double cones to single cones.

(3) The original cones were fitted with hatches in the feed cones to permit clearing of the concentrator slots. These openings were found to be too small for practical operation but, when they had been enlarged, the mechanical strength of the cone was reduced and the feed-distribution cones distorted. These hatches also caused some of the pulp to spray onto the surrounding steelwork, causing corrosion.

(4) Density control by recycling of a middling cut was provided. The control of this recycled portion was to be automatically effected by an activator regulating the slot size. In the event, it was found that the combined corrosive action of the mine water and the pyrite material very quickly prevented any adjustment of the slot. Also, attempts to provide a steady, controlled feed to the plant were frustrated by fluctuations in the overall feed created when one or more of the primary mills was removed from or returned to the circuit.

(5) After a relatively short period of service, it was observed that 'blisters' had developed in the abrasion-resistant coating on the fibreglass-reinforced material of construction. The cause of this was never determined. The effect of the blisters was to disrupt the flow pattern on both the concentrating and the distribution-feed cones.

The Reichert installation was dismantled in the second half of 1981 and is currently being replaced by a plant of eight Johnson drum concentrators and two endless-belt concentrators. Particular attention is being given to the design details, including the materials of construction, distribution of feed, proper acid-washing facilities, and acid fume ventilation.

* Anglo American Corporation of South Africa Limited, P.O. Box 61587, Johannesburg, 2000.