Case Study - Pin Bed Clarifier

WATEREX

Application Gypsum Removal Prior to SX
Location Spain

Waterex Pin Bed Clarifiers

The Waterex range of pin bed clarifiers (PBC) are a series of clarifiers which combine high performance clarification with upflow filtration. In general terms a PBC is the combination of a traditional clarifier and a filter. Our counterflow clarification system captures most of the inert solids so they do not report to the filter zones. This system has a proven capability of handling clarification of over 125,000 mg/l ultra-fine gangue down to less than 10 mg/l, typically 6 mg/l.

To realise reliable optimum performance, the efficient reduction in suspended solids load in the feed is best achieved by ensuring an effective reliable clarification stage. To this end the Waterex range of PBC's come in two basic layouts, unbaffled or open feedwell with baffled designs, the latter for high performance applications.

For this particular pin bed clarifier an internal baffle technology was utilised.

Application

At the time the current filtration method used by the client was media filters. The problem was that the rapid formation of gypsum scales within the filters meant that the filters failed within a very short space of time. Despite the use of various chemicals and other approaches to improve the longevity of the filter media the filter vessels were not achieving the desired result. In fact the filters were finally abandoned in a totally sealed up state.

Pin Bed Clarifier

Pin Bed Clarifier
Plan View

The objective was to treat the overflow from the gypsum thickener supplying acidified pregnant liquor to the solvent extraction process. In the copper process it is necessary to remove the gypsum along with other residual ultra-fine gangue material prior to passing the pregnant liquor through to solvent extraction.

The Challenge

The challenge of this project was that the liquors from the gypsum thickener feeding our PBC clarifier were above 80°C before being pumped to cooling towers where they were essentially cooled down to 60°C.

This cooling process has the detrimental effect of supersaturating the liquor with regard to gypsum and, being an acid process, is also saturated with respect to ghost silica. This resulted in a feed of over 600 mg/l total suspended solids (TSS), often in excess of 1.5% w/w TSS.

The Waterex Approach

To provide a solution for this application Waterex designed and supplied its PBC baffled system to treat a highly variable feed solid range of 0.6 to 10% solids by weight. Test work was completed onsite in two stages, laboratory jar tests and pilot plant trials. It was found that the site was using a very high coagulate dose rate. This was adjusted during the pilot plant trials to give a much better result.

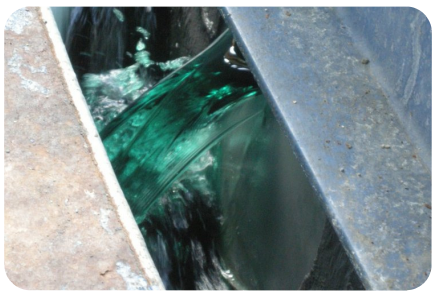
The Result

The counterflow technology allows for a quick recovery time when the operation is upset. During commissioning, the feed tank located overtop of the PBC overflowed into the PBC overflow launder. Employing the counterflow technology, Waterex was able to backwash twice and see an overflow content of 20 mg/l TSS within 20 minutes.

Following effective coagulation and flocculation, the PBC effected efficient separation so that the total residual suspended solids going through to subsequent processing were measured consistently at less than 50 mg/l, typically 20-27 mg/l in spite of the constantly varying feed.

Gypsum Thickener
Feed to PBC

Feedwell
600—7,000 mg/l TSS



Clarified Liquor
20—27 mg/l TSS

Waterex Pty Ltd
28 Beaconsfield Ave
Midvale, Perth
Western Australia 6056

p: + 61 (0) 8 9250 2375
f: + 61 (0) 8 9250 2989
e: sales@waterex.com
w: www.waterex.com