

This case study is at a platinum concentrator in Rustenburg South Africa. The original manual feed splitter was not able to evenly split the streams to the two flotation banks. The design flow rate to each bank is 540m³/h.

Before upgrade



After upgrade



Application

The mine had a simple feed splitter to two parallel rougher flotation banks. The aim was to split the feed to the two banks evenly by volume. Originally slurry was pumped from the mill discharge to the head of the flotation cells where the pipe branched off to the two flotation banks. Each branch had a flowmeter and a knife gate valve and they had to adjust the knife gate valve manually in an attempt to split the flowrate equally to each bank.

The Problem

It was difficult to keep an equal split to the two flotation banks: any changes to the process flow or slurry density required manual adjustment of the valves and the valves experienced excessive wear (because standard knife gate valves are not suited to control applications).

The Solution

eDART replaced the two knife gate valves with dual external dart valves complete with positioners for fine control. The piping layout had to be carefully considered in order to balance the upstream pressure to the two valves. Back pressure pipes were placed downstream of the valves to decouple the discharge pipe from the valve. The valves were sized to control near open to minimise additional pressure on the pump which saves operational costs.

eDART also carried out velocity studies throughout the system in order to prevent pipe chokes and excessive wear (due to the corresponding increase in slurry velocity in those regions), after which a suitable layout, appropriate to the plant, was developed.

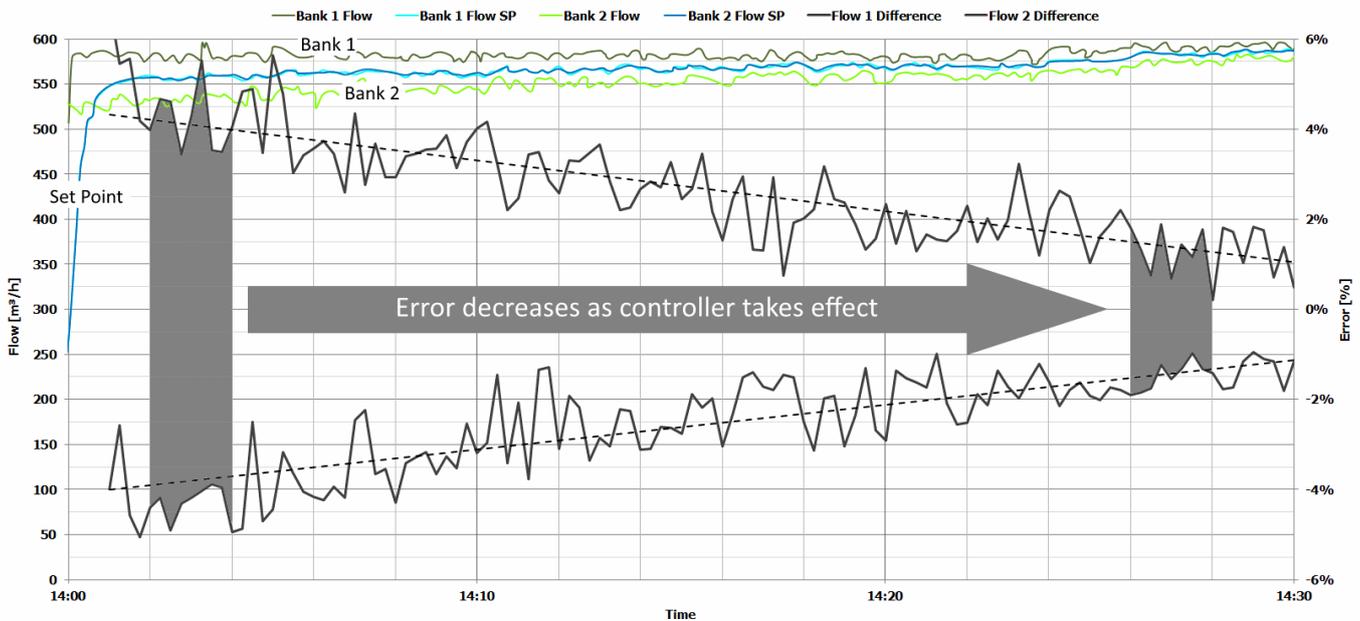
Upon customer acceptance and approval, the new system was manufactured.

Installation and Control Philosophy

The system was installed and commissioned by eDART’s site and service team. Two flow control loops, one for each bank, was configured in the customers PLC. Each of these controllers sent signals to the dart valves via the dual valve controllers – a small field mounted, low power, controller that intelligently splits a single signal from the control room to the two valves (rather than allowing two valves positioned in a high velocity, high erosive wear, close to the seat configuration, it will instruct one valve to close and use only the other valve in the low flow conditions). The total flow into the system is measured and fifty per cent of this value is used as the setpoint for the two flow controllers.

Start-up and Final Results

On start-up, before the control system was tuned, the flow rates were not identical. After the control system was tuned, the flow rates to each bank were very close, within a 1% point. (See the trendline shown below)



Advanced Design

eDART employed the use of CFD software in the analysis of this system