FloatStar Level Stabilisation and Flow Optimisation on an industrial Flotation Circuit

by

David Phillpotts and Daniel van der Spuy

ABSTRACT

The concentrator in Papua New Guinea produces Copper and Gold concentrate. A FloatStar Level Stabiliser and Flow Optimiser control system was installed at the concentrator during 2007 and 2008. The system was designed optimise circuit operating parameters, while maintaining base-layer stability.

A trial conducted by the client showed that the plant is getting considerable benefit from the system in terms of stability and recovery. According to the tests results, the FloatStar Level Stabiliser increased the recovery of Copper and Gold by 0.84 % and 2.9 % respectively, while the Flow Optimiser contributed additional recovery increases of 0.9 % and 1.74 % for Copper and Gold respectively.

After a trial period, the full system was purchased by client.

PERFORMANCE DATA AND DISCUSSION

Performance tests

The client performed a trial in order to test the performance of the components of the FloatStar system relative to each other and the DCS-based control.

The test had two objectives:

1. Side by side comparison of parallel units using production data
2. Shift On – Shift Off using metallurgical sampling

Side by Side Comparison

As the client's flotation circuit contains largely parallel lines on each circuit unit, it is possible to run one side in FloatStar Level Stabiliser mode with the other under DCS-based control. This is an ideal test, since the same feed stream is split between the two lines. Both sides were operated in FloatStar Level Stabiliser and DCS mode alternately. This was run for an extended period. As the concentrate streams of the parallel sides are combined, it is not possible to compare the recovery to concentrate directly. Instead, a reduced recovery calculation ((feed grade – tails grade)/feed grade) is used to give an indication of the recovery of Copper and Gold in the Roughers for each mode of control.

The performance resulted in an increase of 0.94% in Copper recovery from the Roughers. Gold recovery was increased by an impressive 3.74%.

Table 1: Side by Side Comparison

	Bailey PID Level Control	FloatStar Level Stabiliser	Difference	% Difference
Rougher Feed Copper Grade (%)	0.94	0.94	0	0 %
Rougher Feed Gold Grade (g/t)	1.09	1.09	0	0 %
Tails Copper Grade (%)	0.123	0.115	-0.008	-6.5 %
Tails Gold Grade (g/t)	0.33	0.29	-0.04	-12.12 %
Rougher Copper Recovery (%)	86.93	87.75	0.82	0.94 %
Rougher Gold Recovery (%)	69.59	73.33	3.74	5.37 %

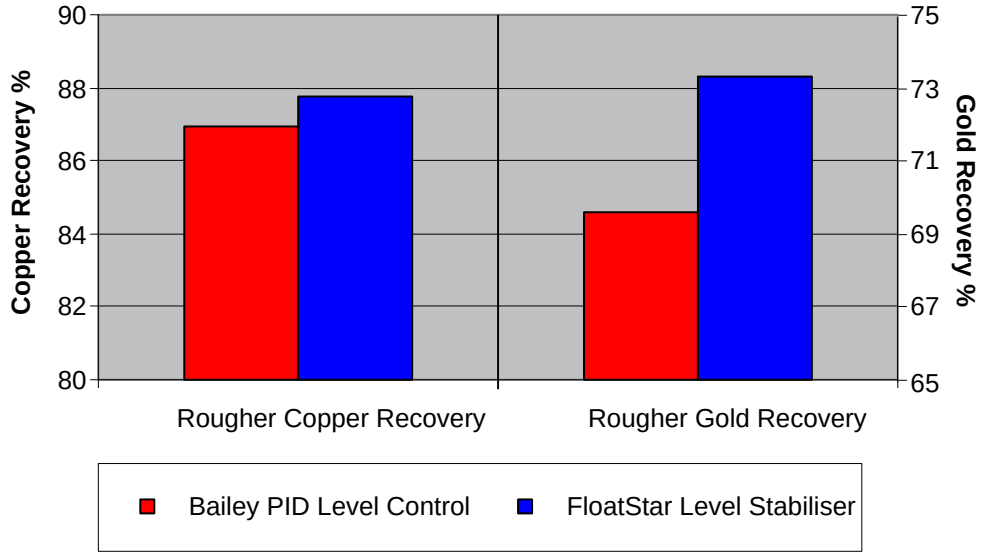

Figure 1: Side by Side Comparison of Rougher Recovery

Shift On – Shift Off Comparison

To completely compare the FloatStar Level Stabiliser, FloatStar Flow Optimiser and DCS-based control, a Shift On – Shift Off test was used. This allowed for full recovery calculations (for the Roughers and for the plant recovery) as the concentrate could be separately sampled. The Rougher Copper and Gold recovery improved by 1.68 % and 3.66 % respectively. The plant Copper and Gold recoveries improved by 0.84 % and 2.9 % respectively. These results are summarised in Figure 2 and Figure 3.

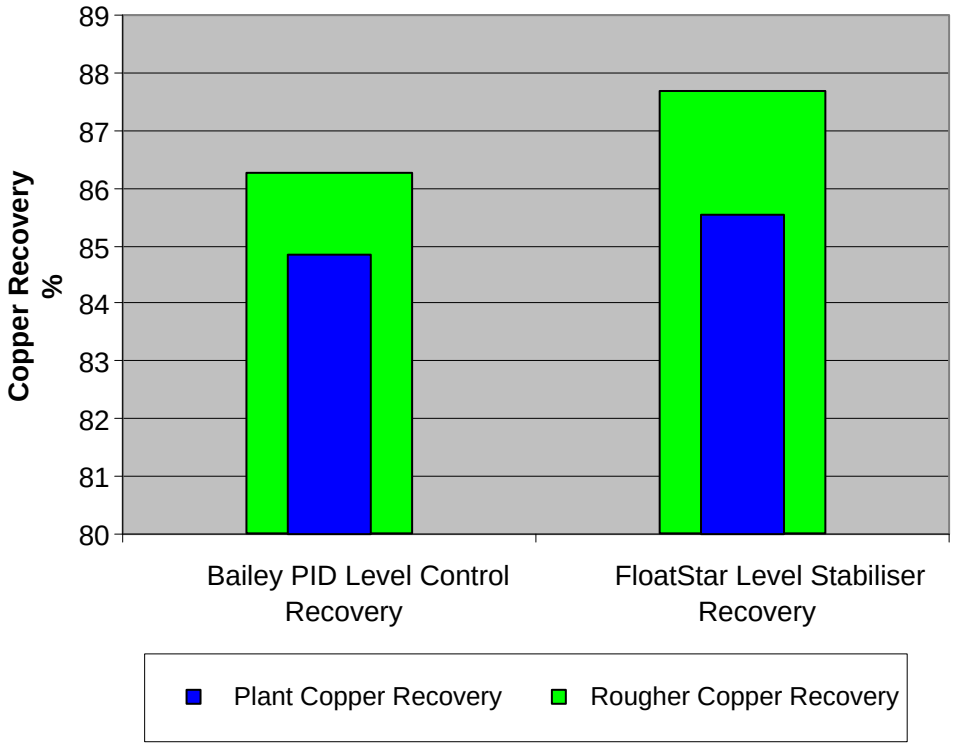

Figure 2: Shift On – Shift Off Comparison of Copper Recovery

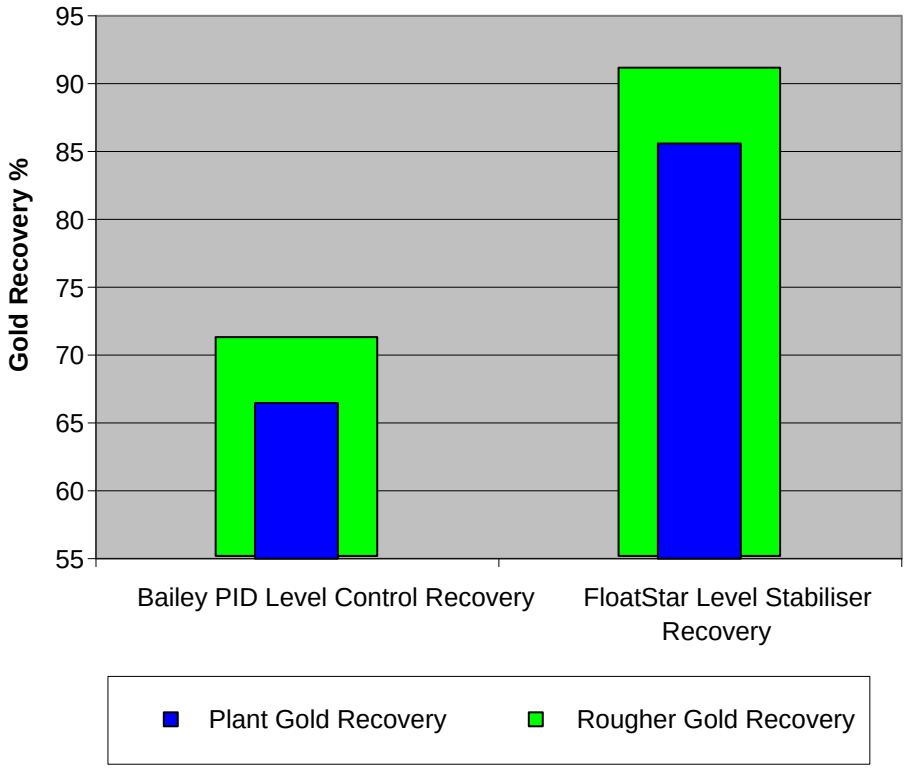

Figure 3: Shift On – Shift Off Comparison of Gold Recovery

Another experiment was performed to compare the FloatStar Level Stabiliser with the FloatStar Level Stabiliser and Flow Optimiser working together. The Rougher Copper and Gold recovery improved by 1.15 % and 1.34 % (respectively) when the Flow Optimiser was

used in conjunction with the FloatStar Level Stabiliser. The plant Copper and Gold recovery improved by another 0.9 % and 1.74 % (respectively) when the Flow Optimiser was used in conjunction with the FloatStar Level Stabiliser. These results are summarised in Figure 4 and Figure 5.

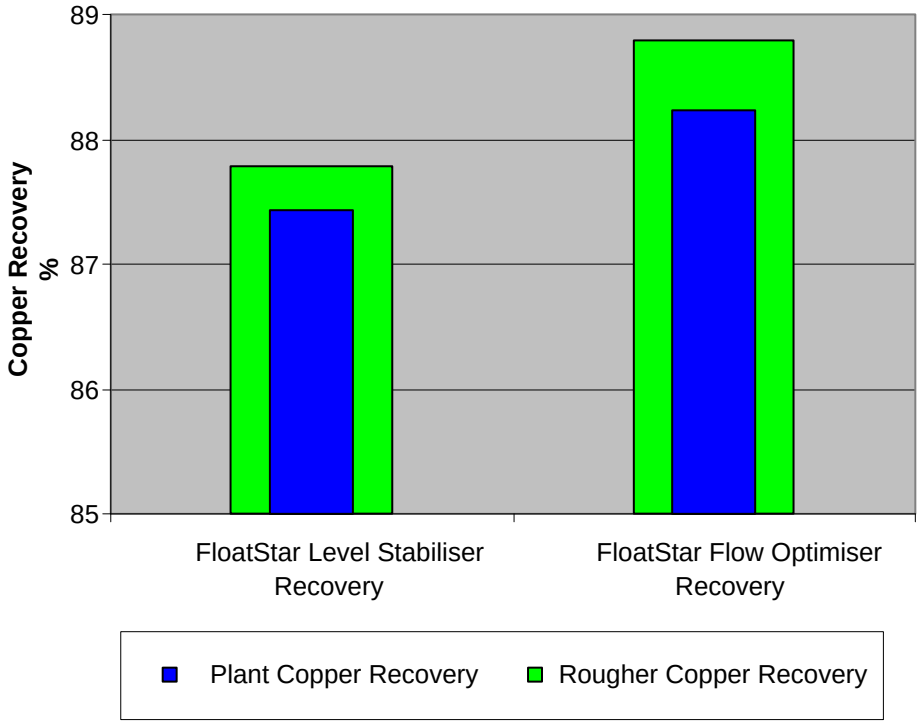

Figure 4: Shift On – Shift Off Comparison of Copper Recovery for FSLS and FSFO

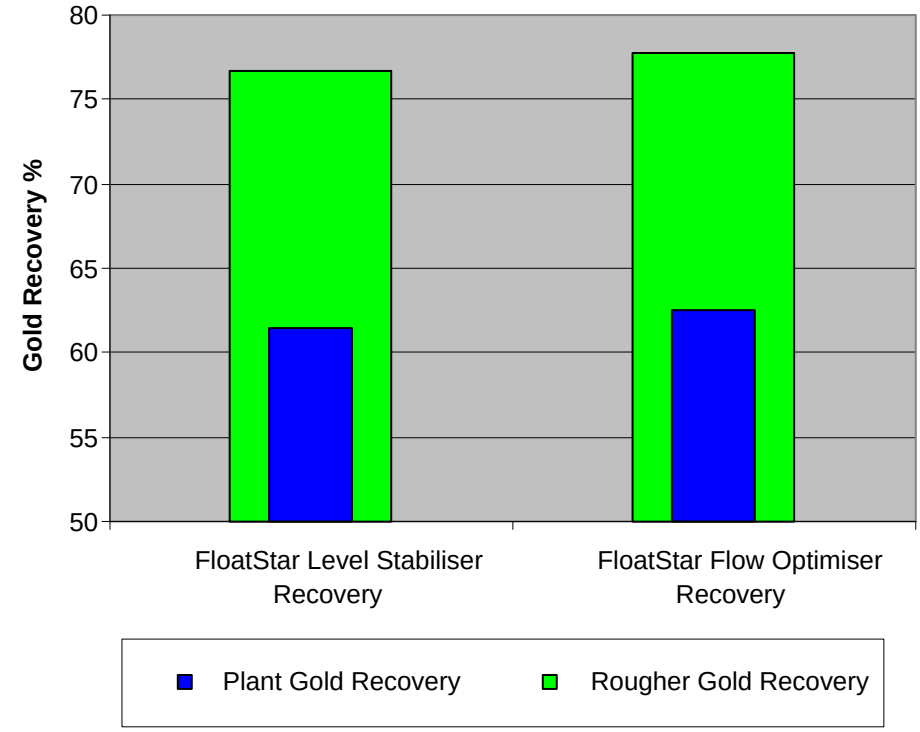

Figure 5: Shift On – Shift Off Comparison of Gold Recovery for FSLS and FSFO

CONCLUSIONS

The extended testwork that was performed at Ok Tedi clearly shows that the FloatStar control system has dramatically improved stability, operability and the recovery of the flotation circuits. Table 2, below, summarises the results:

Table 2: Summary of results

	Increase in Recovery *Copper*	**Increase in Recovery** *Gold*
FloatStar Level Stabiliser	0.84%	2.9%
FloatStar Flow Optimiser *(incremental improvement on the Level Stabiliser)*	0.9%	1.74%