

# Mining Process Control Solutions

Flotation Optimization and Control

## Application challenges

Flotation challenges can arise in various ways, the most coming being from optimization, stabilization and level control. By mitigating these challenges, mining companies can focus on their primary objectives, increasing productivity and ultimately profits.

## Flotation control

Flotation is the most widely used process for extracting minerals from their ores. Although the process was developed as long ago as the early 1900s, flotation remains one of the most complex mineral processing operations.

## Flotation challenges

### Optimization and stabilization

In flotation, multiple variables are interconnected:

- Reagent use
- Control variables like particle size, pulp density, temperature and feed rate
- Equipment design
- Circuit design

A change to any one of these variables has an impact on the rest. This makes optimizing and stabilizing flotation circuits a challenge.

### Level control:

The level control of coupled flotation cells is a complex task because of high interactions between the variables – if something impacts an upstream cell, it will create implications for downstream cells. For example, if the level control valve in an upstream cell opens up, it allows more slurry into the downstream cell, increasing that cell's level, which in turn opens the second cell's level control valve. This means a disturbance in the first cell will be seen in each cell thereafter, compounding the issues seen.

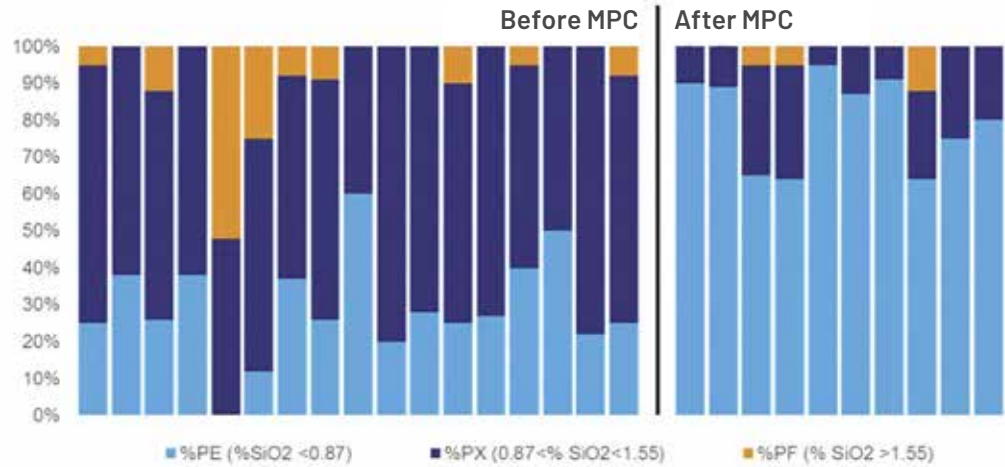


# Solutions for flotation optimization

## 1. Model Predictive Control Solution

Model predictive control (MPC) technology, coupled with our control system, continuously assesses current and predictive operational data, compares them to desired results and computes new control targets. This helps to reduce in-process variability, operate within equipment constraints and improve performance. In the case of optimization flotation circuits, MPC delivers:

- Better recovery
- Better grade
- Fewer reagents used



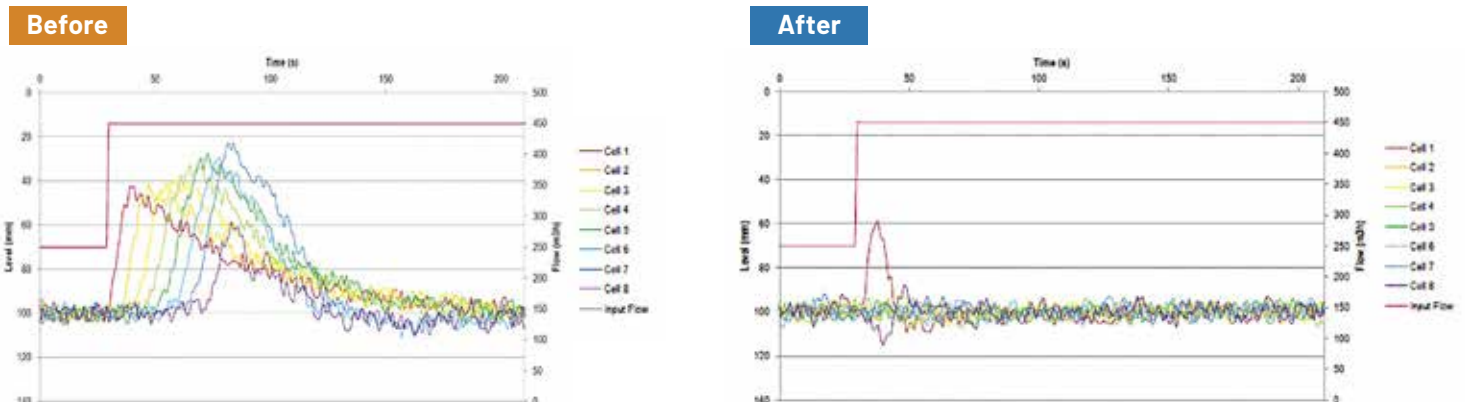
Example – After the MPC implementation it is possible to verify the better recovery of higher quality iron ore.

## 2. Flotation Level Control

This simple control-based stability solution can be used standalone or incorporated with model predictive control for additional benefits.

The level control solution builds an internal response model for each individual cell, allowing for fast initial changes to input disturbances, minimizing disturbances.

- Fast response to disturbances
- Adaptive control that accommodates deteriorating valve performance
- Reduced dependency on specialized software and expert engineering labor
- Consistent level control for better optimization of other variables such as air and reagent addition
- Logix-based control allows for fast integration and high availability
- Operational settings and diagnostics available on the supervisory system



Example – By implementing level control, disturbances are drastically reduced.