



INTERLATE

# Recovery of process water from a concentrator tailings thickener

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CASE STUDY – INTERLATE

10/19

## TABLE OF CONTENTS

About Interlate

**CASE STUDY** - Recovery of process water from a  
concentrator tailings thickener

Results

# About Interlate

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Interlate is a technology company who provides sustainable productivity improvements in mineral processing plants.

Interlate has developed a proprietary technology and decision support model to help operations teams drive productivity improvements through real-time operational data. Backed by a team of industry specialists, Interlate builds intelligent self-learning models that continuously scan plant data to uncover value opportunities from all value drivers in the plant.

Operating from a state-of-the-art Operations Intelligence Centre in Brisbane, Interlate has helped many natural resource companies, locally and internationally, to reduce operational risk and increase productivity.

To find out more about Interlate, please click here : [INTERLATE](#)



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# CASE STUDY

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RECOVERY OF PROCESS WATER FROM A CONCENTRATOR  
TAILINGS THICKENER

# Challenge

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**For minerals processing operation, managing the regulatory compliance and reputational aspects not to mention cost implication of freshwater consumption is a very topical matters.**

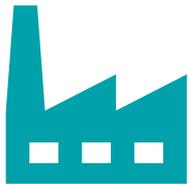
For many operations around the globe, freshwater consumption is magnitudes higher than the consumption rates of the adjoining communities. This can become an obvious stressor for all stakeholders. With the rising price of water comes the need for efficient consumption to control operating cost.



**Somewhere along the line almost every person associated with the mining and mineral processing industry, regardless of continent around the world, would empathise with this.**

# Situation

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**A mine and minerals processing plant operates in a region that experiences an extended dry period, consequently water resources (above and below ground) are very scarce.**



**To further exacerbate the situation, a major structural failure occurred to circuit infrastructure, meaning return process water pump sets were out of commission for an extended period.**

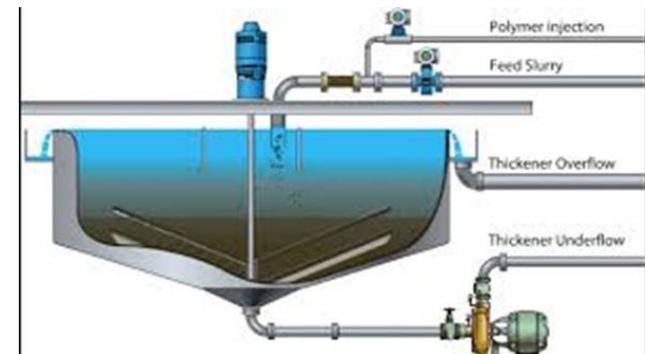
Normal return process water was not immediately available.

Alternative infrastructure was being engineered, but not in a short time frame and not without considerable cost.

Operations suspended for response and recovery.

# An Innovative Approach

- One option for reducing fresh makeup water consumption is to be consistently more efficient at recovery of existing in-circuit process water stocks, prior to sending to tailings storage facility.
  - This is particularly attractive when the solution is achieved very quickly and at NO capital cost.
- In this use case we will talk about a solution that identifies the operational tactics / parameter set points for a concentrator tailings thickening process to minimise consumption of fresh makeup water.
- **Note:** Thickeners are mechanically continuous process equipment which operates on a particle / floccule sedimentation principle where in simplest terms the solids settle to the bottom of the thickener tank and the process water overflows to a storage tank. Some water is required to convey / pump the sediment in a slurry form from the underflow to a tailing storage facility. % solids in the underflow varies from operation to operation and from design to design (e.g. pump or gravity tailings outfall).



# Applying Data-driven Approach



**Different classes of process water were created using characteristics (e.g. % solids, reagent content, mineralization, etc). These classifications are referred to as “Productivity Groupings”.**

Productivity Groupings are statistically unique both in characteristic and parameter set points.

This was about recognising that different inputs need to be treated differently in the thickener. Similar to different ore feed types into a concentrator.



**Productivity Groupings, plant performance / process and other data sources for 12 months of historical data, were fused together in a hyper-variant model.**



**A visualization interface allowed filtering of data associated with each Productivity Grouping.**



**Exploratory analysis across all thickener parameters (e.g. flow rate, bed level, flocculate addition, underflow density, etc) simultaneously allowed identification of strongest set point value combinations with respect to recovery of existing in-circuit process water.**

# Solution

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- In the following slide flocculant dosage and dilution water rates are used as example parameters for set point selection.
- The technique generates a binned scatter plots of the parameters which allows selection of data ranges that drive an uplift in process water recovery.
- A clear inflection point is observed on the interface for flocculant dosage rate. The inflection representing highest process water recovery at that dosage rate.
- Operational tactics / parameter setpoints were determined (at 95% statistical C.I.).
- This identified the best past recycle performance and was the new benchmark going forward.
- A region of higher water recovery is also observed at dilution rates of 40-45m<sup>3</sup> per hour.
- As the operation continued to tightens up the data around these new target set points, the data density increases and further optimisation occurs.





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# RESULTS

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# 4% REDUCED FRESH WATER CONSUMPTION

- Pre-selection average process water recovery for the 12-months of data was 59.6%.
- Post-selection gave rise to absolute water recovery increase of ~4% from 59.6% up to 63.5%.
- For process water flow rate of ~1000m<sup>3</sup> per hour into the thickener (i.e. 1300tph mill throughput @ assumed 30% solids), equates to ~960m<sup>3</sup> per day of reduced fresh makeup water consumption.
- Sets of operating tactics that lift water recovery performance are identified in a few seconds.
- In this use case the identified thickener parameters lead to an increased water recovery of 4%:
  - While there may not be a directly tangible financial benefit, water efficiency is an important community matter to manage, in the best of seasons.
  - Assist compliance with increasing regulatory and permitting conditions.