

Brownstock Washing Improvements

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Outline

1. Brownstock Overview

2. 2020 Brownstock System

3. New Piping

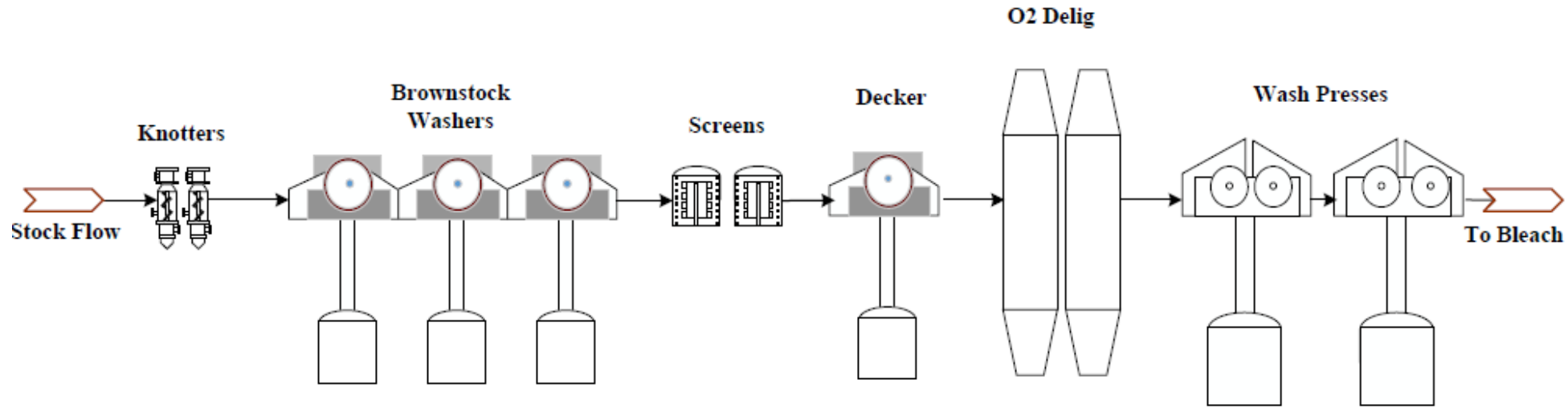
4. Filtrate Controls

5. Next Steps

Problem Statement

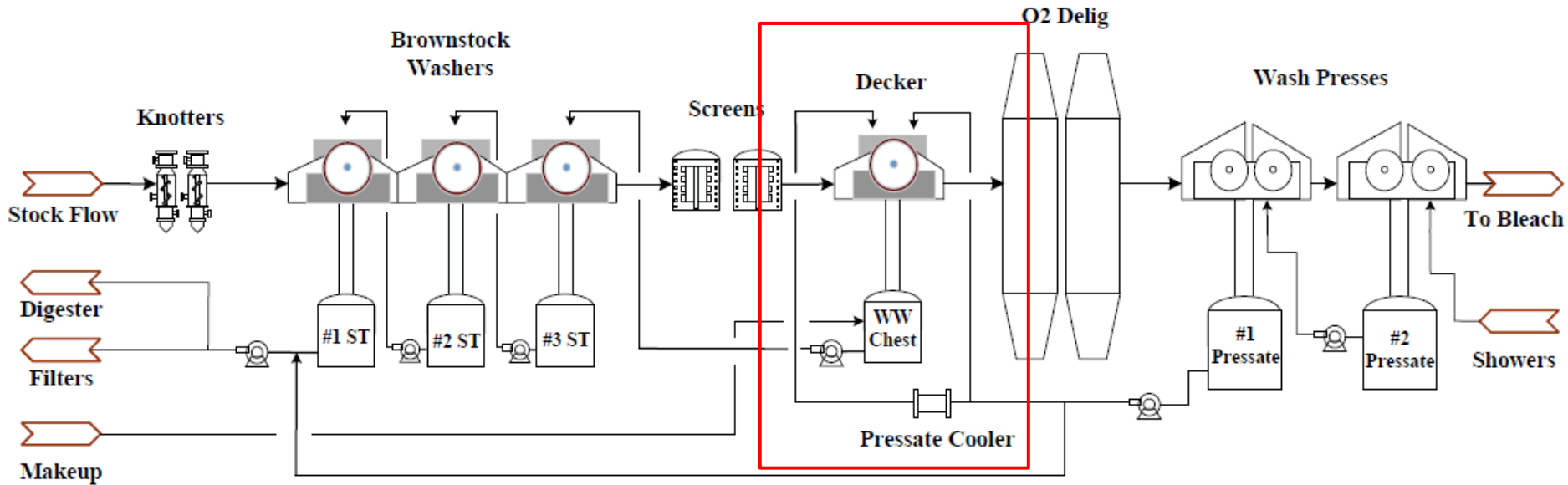
- ▶ The Kamloops mill was struggling with poor Brownstock washing that was resulting in high chemical costs and ultimately limiting the production rate.

Kamloops Brownstock Overview



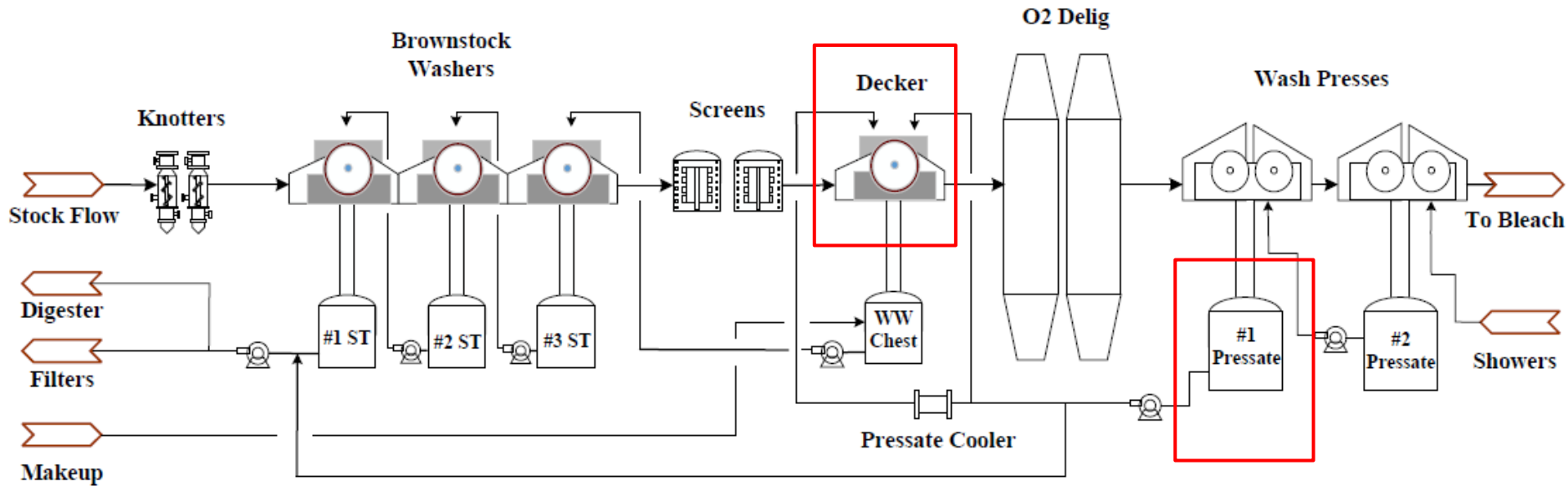
Brownstock in 2020

Poor Decker operation → Limited shower application
Decker WW chest making up with warm water



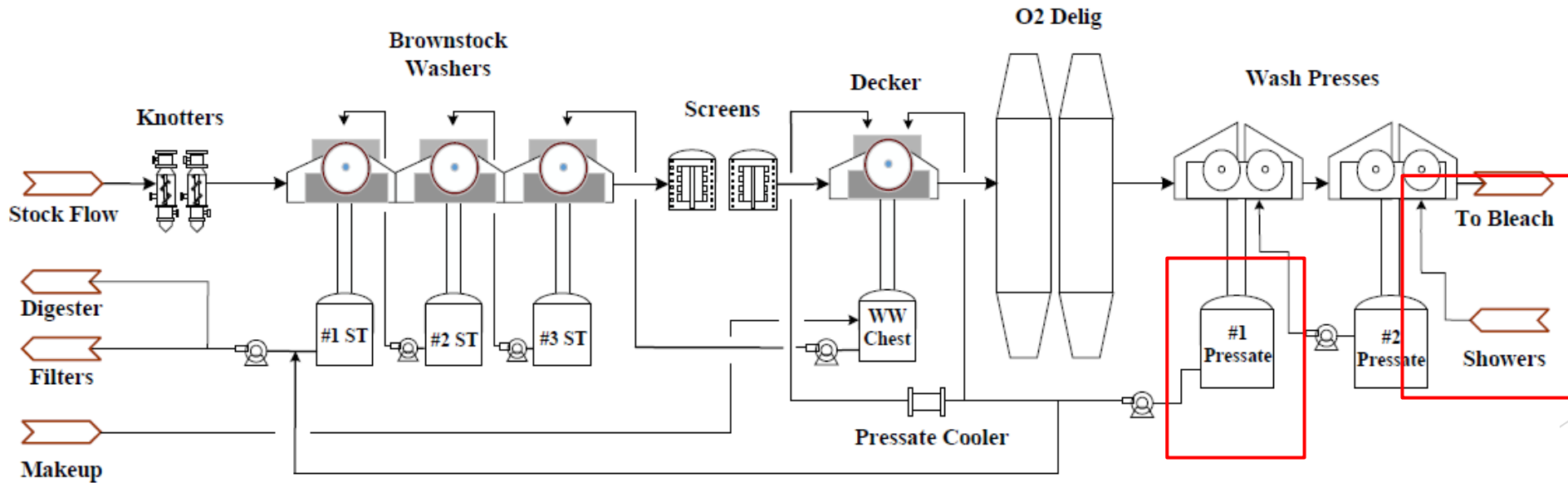
Brownstock in 2020

Poor Decker operation → Pressate tank level control issues
Maximizing Pressate bypass



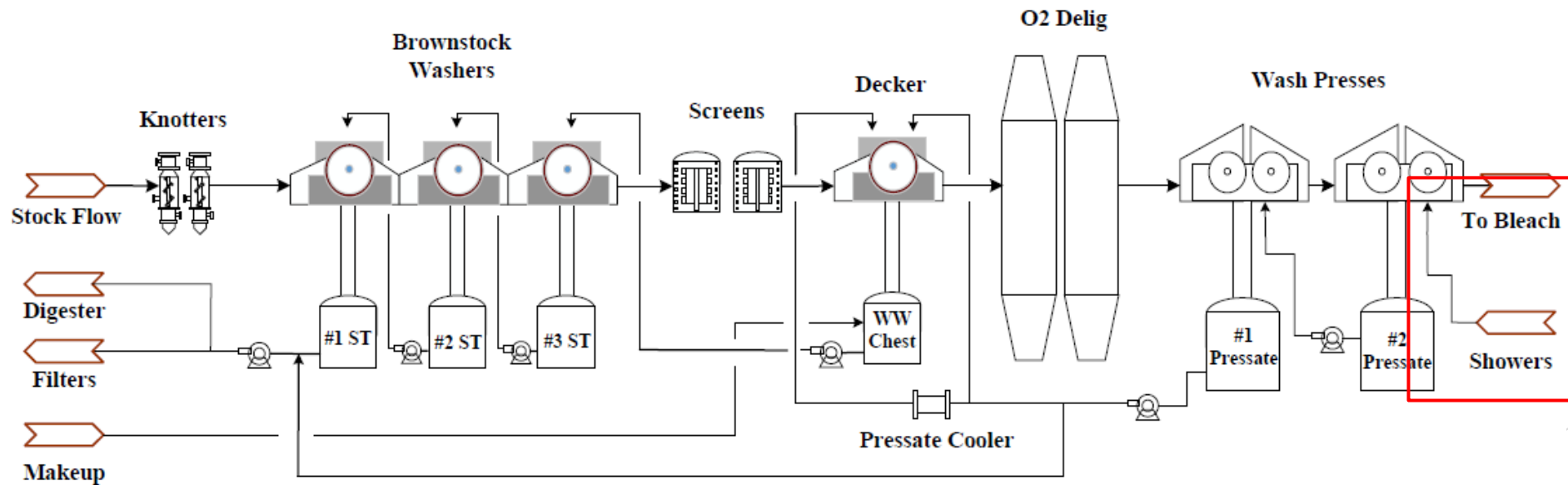
Brownstock in 2020

Pressate Level control issues → Minimal showers to #2 Wash Press
→ Ultimately limiting Digester rate



Brownstock in 2020

- Minimum showers to #2 Wash Press → High Brownstock Conductivities
- Conductivity increasing across Decker
- Limited use of Oxidized White Liquor (OWL) in O2 Delig



Brownstock in 2020

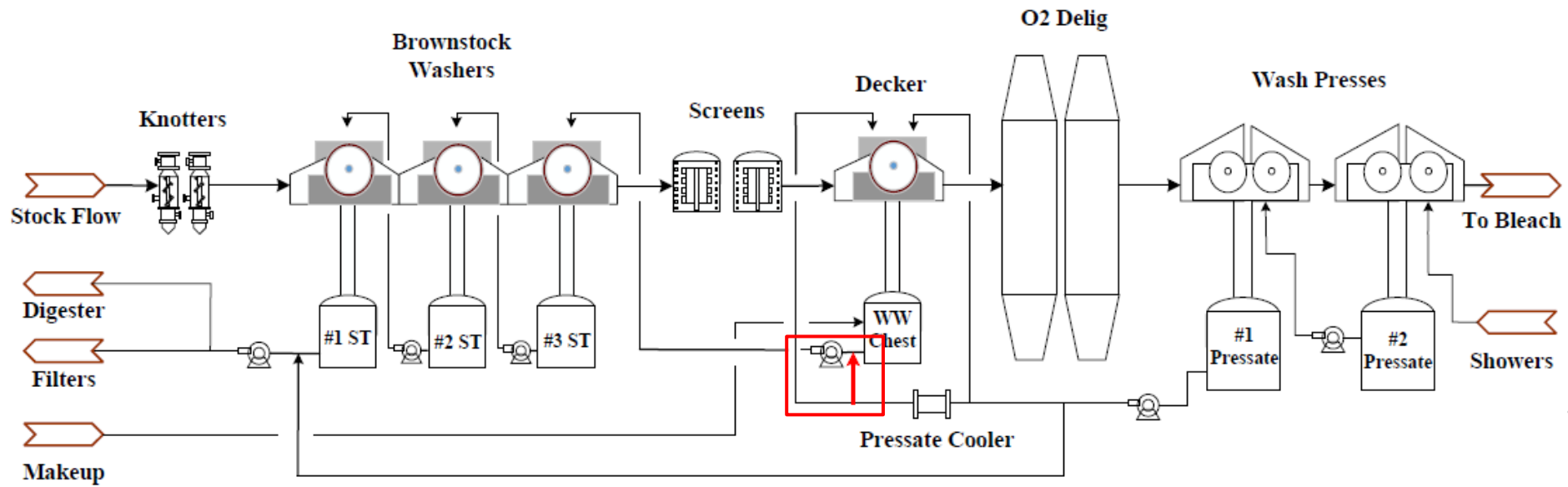
- ▶ Limited shower flows on Decker, conductivity rising across Decker, applying ~350 gpm of fresh water to the Decker WW chest for level control
- ▶ Level control problems with #1 Pressate tank - Limiting #2 WP shower flows and Digester rate
- ▶ Bypassing 800 gpm of Pressate from #1 Pressate tank to #1 Seal Tank
- ▶ Dilution Factor of -0.4 on final washing stage
- ▶ Limiting use of OWL in O2 Delig due to high Brownstock conductivities

Washing Improvement Goals

- ▶ Maximize showers across washers, if need to bypass then bypass to next stage
- ▶ Better level control → Not rate limiting
- ▶ Lower conductivities in Brownstock → Not limiting use of Oxidized White Liquor (OWL) in O2 Delig, lower Bleach chemical costs
- ▶ Apply fresh water to final washing stage (#2 Wash Press)

Brownstock in 2021

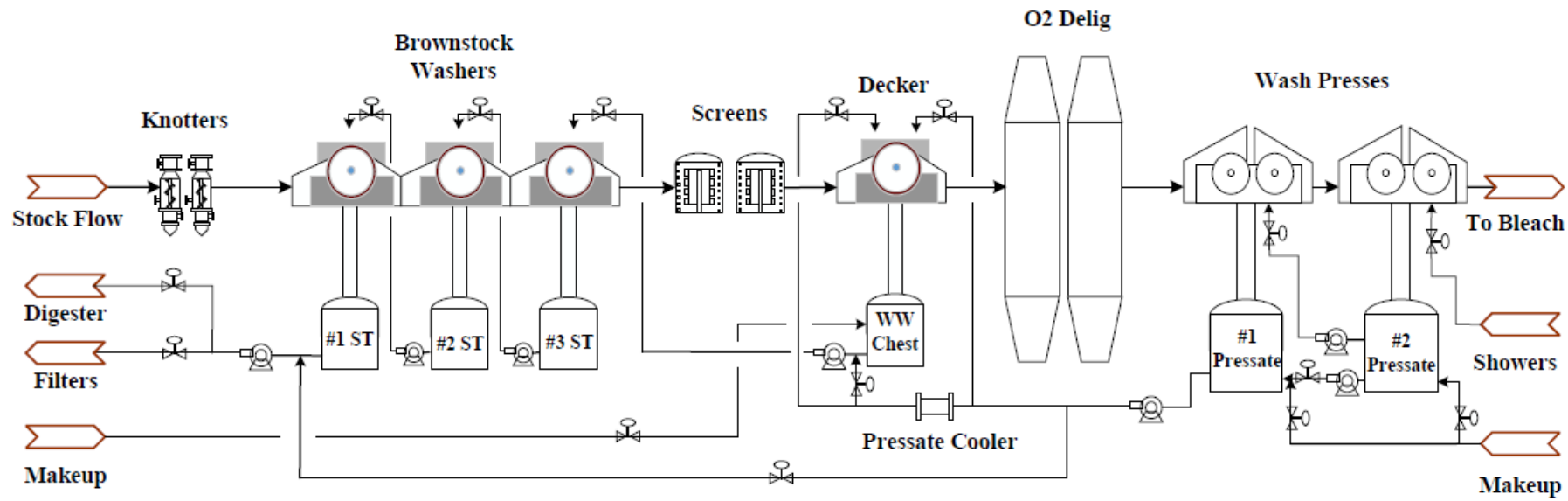
New Pressate Bypass Line and focused on increasing Decker Showers



Pressate Bypass Results

Parameter	2020 Benchmark	2021 Pressate Bypass
Decker Vat Conductivity (μS)	13,600	17,500
Decker Mat Conductivity (μS)	17,100	15,400
Decker Conductivity Reduction (%)	-25.5	12.0
Decker WW Chest Makeup (%)	23	0
% Delig (%)	37	40.5
#2 WP Mat Conductivity (μS)	9,900	7,500
#2 WP Showers (gpm)	330	350

Filtrate Control Program



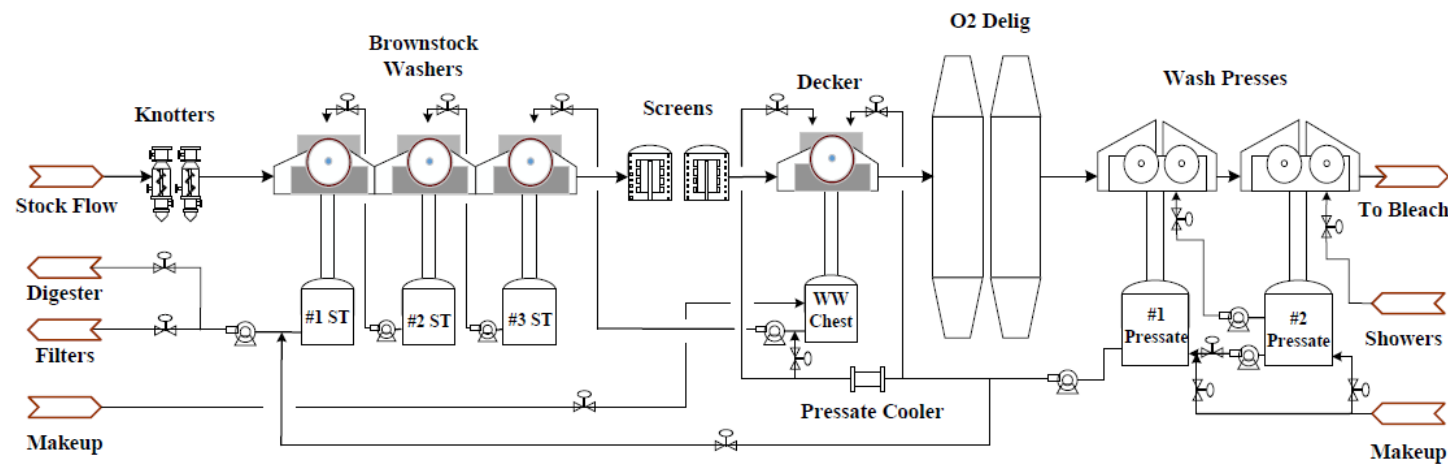
Filtrate Control Program

► Pre filtrate controls

- Multiple manual setpoints based on operator intuition
- Fresh water making up in the middle of the process
- Didn't know capacity of system

► Filtrate controls

- Flows always maximized for operating conditions
- Prioritize feeding showers across washers before bypass lines
- Prioritize adding fresh water to last washing stage (#2 Wash Press)
- Good control over tank levels



Filtrate Control Program

- ▶ Based on historical values of flow to weak black liquor filters and digester dilution, a target flow out of the system is calculated.
- ▶ This flow can be biased up or down depending on operation
- ▶ Prioritize feeding showers across washers before bypass lines
- ▶ 6 different tanks are level controlled by 18 different valves running in a level range schedule which prioritizes shower flows.
- ▶ Tank levels are all proportional control
- ▶ High and low level protections

Filtrate Control Implementation

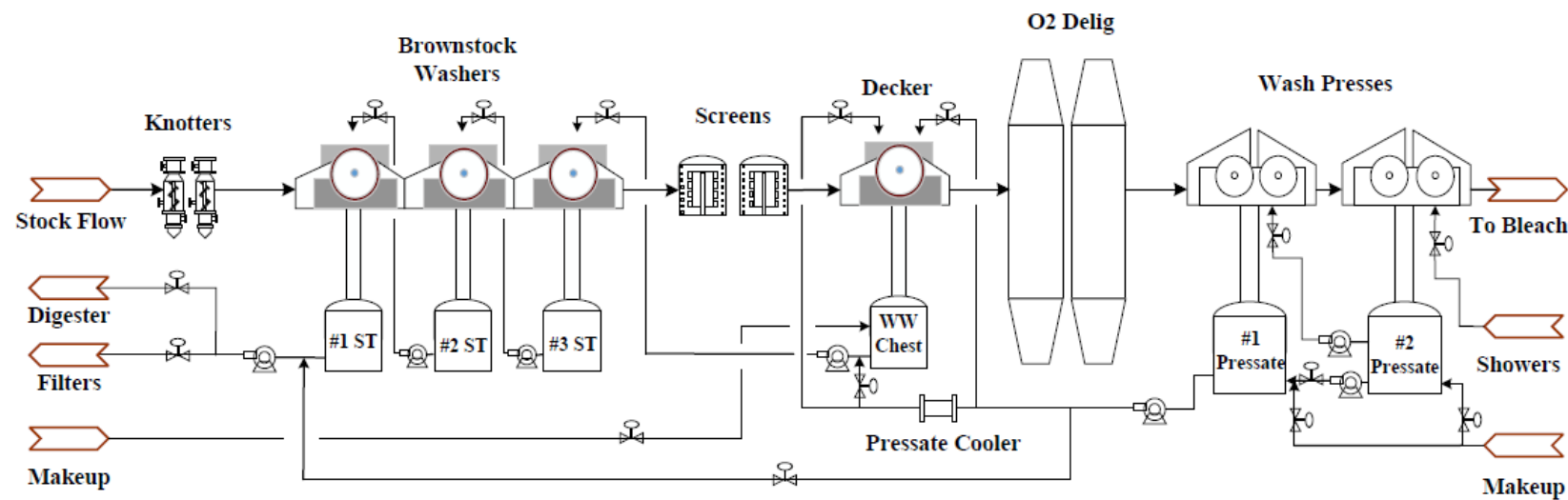
- ▶ Started implementation Oct 2021
- ▶ Difficult to change operation culture/operator intuition
 - ▶ Level set points different
 - ▶ Shower flows abnormal
 - ▶ Water addition points different
- ▶ Lots of support to implement
- ▶ 95% in control since April

Results

Parameter	2020 Benchmark	April 2022 Filtrate Controls	% Difference
#2 Wash Press Showers (gpm)	330	570	72.5%
WBL Flow to Evaps (gpm)	2,670	2,690	0.6%
#2 Wash Press Conductivity (μ S)	9,900	5,500	-44.5%
% Delig (%)	37.6	44.5	18.4%

Conclusion

- ▶ Maximizing showers across the Washers
- ▶ Great level control, no longer rate limiting
- ▶ Controls are resilient, works at minimum and maximum rates
- ▶ 44% reduction in conductivities
- ▶ 16% reduction in Bleach Plant chemical costs
- ▶ Running OWL in O2 Delig more frequently



Next Steps

- ▶ Fresh water reduction projects
- ▶ Controller Tuning
- ▶ Improve Decker performance
- ▶ Increase O2 Delig performance

Acknowledgements

- ▶ Dave Code - Sunshine Automation Services
- ▶ Brock Fraser - Sr Process Control Engineer
- ▶ Keith Skopyk - Digester & Brownstock Superintendent
- ▶ Shift Coordinators
- ▶ Digester Operators & Field Operators
- ▶ Process Technicians

Questions?