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Johnsonburg Mill

RAPID BLEACHING OPTIMIZATION USING ADVANCED INSTRUMENTS AND CONTROLS

Mill Sponsor – Bill Boylan – Domtar
Presenter – Holt Crenshaw – Valmet

Holt Crenshaw

- 37 years working in Pulp and Paper Mills for various companies at several locations on many platforms.
- Always focused on Process Control and Process Optimization.
- Prefers engineering over management.
- BA/BS in Chemistry/Chemical Engineering (Hendrix College/Columbia University)
- Professional Engineer (Process Controls)
- Currently responsible for implementing Advanced Process Control projects in the digester, washing and bleaching areas.
- Sr Optimization Engineer
- Holt.Crenshaw@Valmet.com

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Valmet Bleaching Optimizer (VBO)

- Project Summary
- Project Results
- Johnsonburg uniqueness
- Sustainability activities.
  - ClO2- control
  - Alarms

Business Objective Served by This Project

- To upgrade existing Kappa analyzer equipment with a new sample location and add absolute brightness measurements
- Implement Bleaching Optimizer to obtain optimal chemical savings

Johnsonburg is unique because:

- Use Near-Neutral Bleaching approach
- Periodic use of xylanase enzymes in the brown HD.
- Brightness target is near the brightness ceiling for their process.

Project Time Line

• Project Kick-off Meeting	Feb 2021
• New KappaQ1 and KappaQC Mods received and installed	Jun 2021
• VBO computer images installed	Jun 2021
• New KappaQ1 and KappaQC calibrated	Aug 9, 2021
• VBO commissioning and start-up	Aug 9-21, 2021
• Optimization and trouble shooting	Aug 21-31, 2021
• Project Impact Performance Run (30d)	Sept 2021
• Begin Sustainability/Optimization	Oct 2021

Project Benefit achieved within one week of turning on the controls.

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MPC Control Matrix

MV-DV \ CV		D1	EOP			D2		
		D0 Outlet pH	E1 Kappa	E1 Brightness	E1 Outlet pH	D1 Outlet pH	D1 Brightness	D1 Chlorite Residual
D1	ClO2 Dosage (MV)	✓	✓	✓	✓			
	pH Inlet Dosage (MV)	✓						
	Inlet Kappa/Cormec (DV)		✓	✓				
	Inlet COD Index (DV)		✓	✓	✓			
EOP	NaOH Dosage (MV)		✓	✓	✓			
	H2O2 Dosage (MV)		✓	✓	✓			
	O2 Dosage (MV)		✓	✓				
	Inlet Ph (DV)			✓	✓			
D2	ClO2 Dosage (MV)					✓	✓	✓
	NaOH Dosage (MV)					✓		✓
	Inlet Brightness/Cormec (DV)						✓	✓

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Project Impact

- Project proposal guaranteed a savings of ClO2(-7%) and NaOH(-5.25%).
- Project results
  - ClO2 savings of 7.7%
  - NaOH savings of 7.3%
  - High Operator acceptance (98% utilization)
  - Final brightness COV of 0.27% and centered on target.
  - Performance run began two weeks after VBO startup, which began as soon as the instruments were ready.

After the project, sustainability and optimization efforts indicated an opportunity to improve ClO_2^- stability by actively controlling the ClO_2^- residual instead of controlling the after-tower pH. The Chlorite was modeled, and a trial is in progress.

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Sustainability Activities

Past

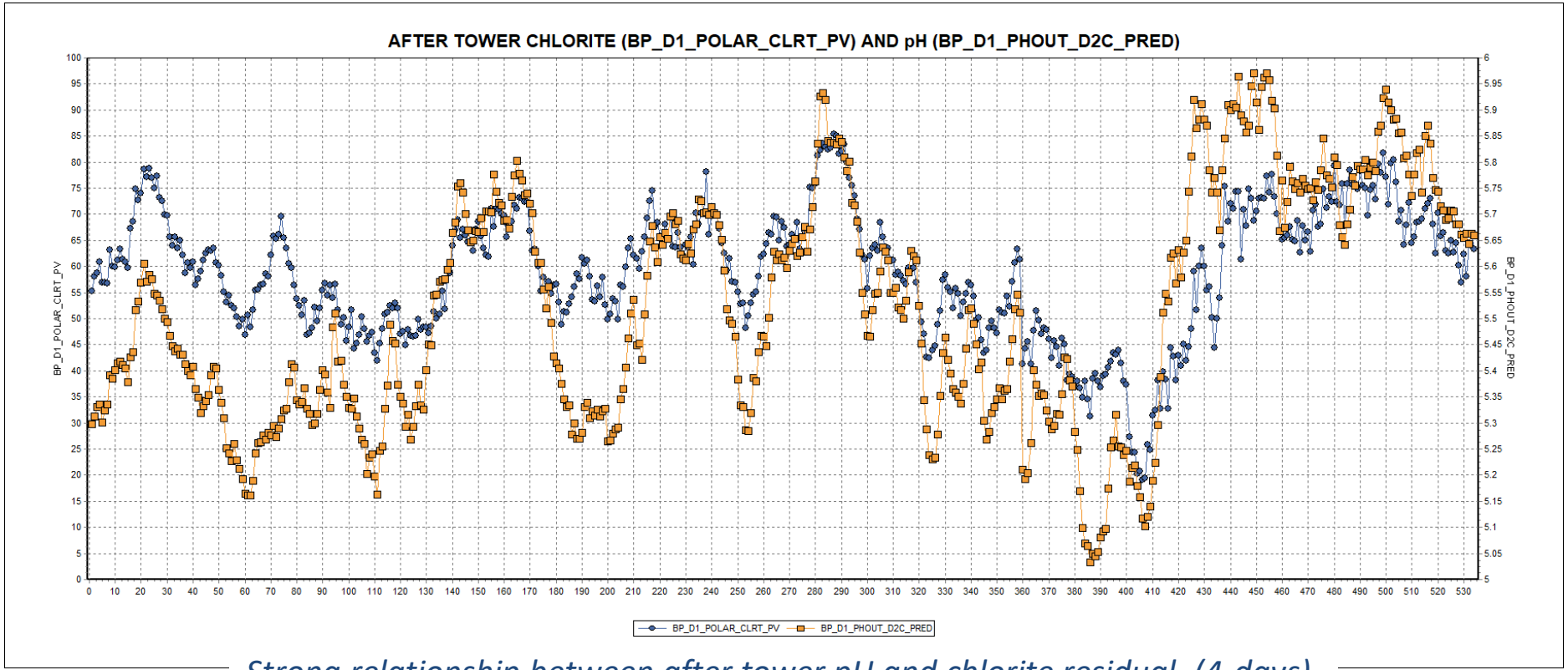
- High Brightness Runs – Created an new grade and fixed KappaQ calibration issue with high bright pulp. Improved lab brightness procedure.
- Carryover Detector developement – added BSW conductivity and tuned BP feed controls to handle high carryover events.
- Created ParcView Instrument Error charts for tracking instrument vs lab test to help maintain instrument accuracy.
- Checked appropriateness of final brightness target for machine needs.

Sustainability Activities

On Going

Optimize chlorite (ClO_2^-) residual in D2 Stage

- **Picked the best ClO_2^- target for brightness retention in bleached HD.**
- **Tuned D2 exit pH control as part of the project, but believe control of ClO_2^- directly will improve brightness stability. Model created and awaiting outage.**



Strong relationship between after tower pH and chlorite residual. (4-days)

Sustainability Activities

On going

- Investigate EOP filtrate color after optimization
  - **Increased EOP H2O2 trials – No significant impact from higher H2O2 to EOP. Trial H2O2 in filtrate tank?**
- Check impact/control on the ClO2 scrubber
- Improving alarms to the DCS to detect VBO running on a limit.

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QUESTIONS?

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