Asset Optimization of Kamyr Digester

COOK-X – WASH
Washing at the bottom of a vapor phase continuous digester

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Outline

Mill Overview
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Mill Overview

- Skookumchuck Pulp Inc.
  - Located in the East Kootenays, north of Cranbrook BC
- 900 admtpd Softwood fully bleached
  - SPF wood mix, “pine beetle left over”
  - Trucks and on-site chipper
- Hydraulic impregnation vessel followed by vapor phase continuous digester designed for 375admtpd;
- Produces green power for export to the grid;
- Mill is well balanced and almost maxed out at recovery boiler and pulp machine

Drivers for optimization

- Several senior operators are to retire within years;
- Standardization of operation around the digester;
- Optimize digester wash zone
  - best brown stock washer;
  - digester is massively hydraulically overloaded;
- Reduction of Kappa # standard deviation;
  - Kappa# at the digester drives pulp machine runnability.

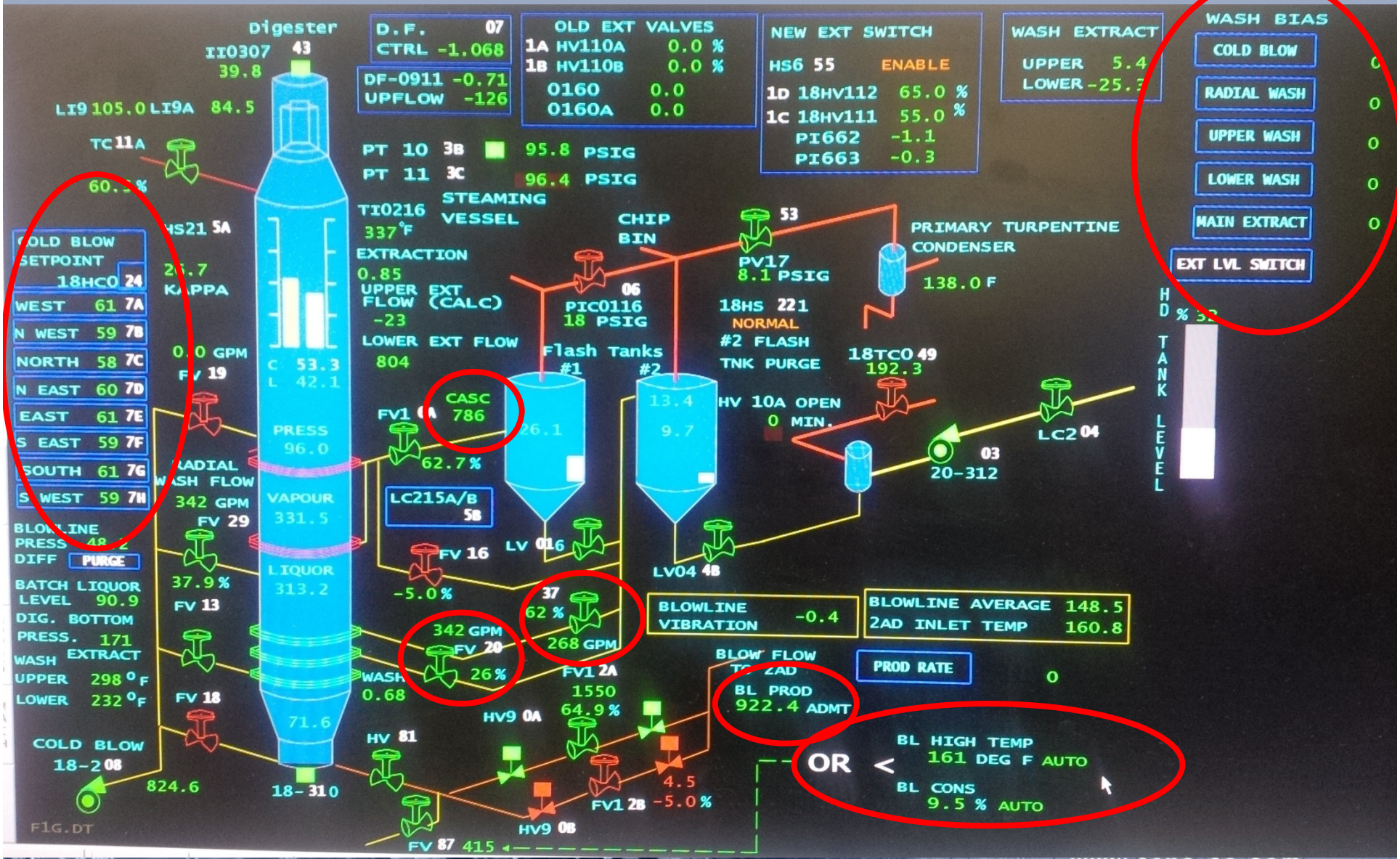
Issues

- Digester is massively hydraulically overloaded; rank #1!
- High blow line temperature causes diversion around double stage atmospheric diffuser (2AD);
- Kappa# at the digester drives pulp machine runnability;
- Issue with “weekend wood”
- Never had AUTO mode on digester liquid level;
- Small blow line 6”… at 900 admtpd;
  - vibration is an issue
  - blow line pluggage

Deliverables

- Blow line consistency control;
  - Consistency soft-sensor;
    - Blow ton production;
- Blow line temperature control;
  - Cold blow cooler control;
- Automation of cold blow, wash, radial and extraction flows;
- Digester liquid level;
- Operator biases;
- Production rate change and temperature control;
- Adjustment of pressure / temperature control;
  - Mill air instead of compressor;

Digester


Digester
II0307 43
39.8
LI9 105.0 LI9A 84.5
TC 11A
60.
COLD BLOW SETPOINT
18HC0 24
WEST 61 7A
N WEST 59 7B
NORTH 58 7C
N EAST 60 7D
EAST 61 7E
S EAST 59 7F
SOUTH 61 7G
S WEST 59 7H
BLOWLINE PRESS
DIFF PURGE
BATCH LIQUOR LEVEL 90.9
DIG. BOTTOM PRESS. 171
WASH EXTRACT
UPPER 298 °F
LOWER 232 °F
COLD BLOW 18-2 08
824.6
F1G.DT
HS21 5A
KAPPA
GPM
FV 19
RADIAL WASH FLOW
342 GPM
FV 29
37.9 %
FV 13
FV 18
18-3 10
C 53.3
L 42.1
PRESS 96.0
VAPOUR 331.5
LIQUOR 313.2
71.6
D.F. 07
CTRL -1.068
DF-0911 -0.71
UPFLOW -126
OLD EXT VALVES
1A HV110A 0.0 %
1B HV110B 0.0 %
0160 0.0
0160A 0.0
NEW EXT SWITCH
HS6 55 ENABLE
1D 18HV112 65.0 %
1C 18HV111 55.0 %
PI662 -1.1
PI663 -0.3
WASH EXTRACT
UPPER 5.4
LOWER -25.3
PT 10 3B 95.8 PSIG
PT 11 3C 96.4 PSIG
TI0216 337 °F
STEAMING VESSEL
EXTRACTION 0.85
UPPER EXT FLOW (CALC) -23
LOWER EXT FLOW 804
CHIP BIN
PIC0116 18 PSIG
Flash Tanks #1 #2
26.1
13.4
9.7
CASC 786
FV1 1A
62.7 %
LC215A/B 5B
FV 16
-5.0 %
LV 016
LV04 4B
HV 10A OPEN 0 MIN.
18TC0 49 192.3
LC2 04
03 20-312
PV17 8.1 PSIG
53
PRIMARY TURPENTINE CONDENSER
138.0 F
18HS 221 NORMAL
#2 FLASH TNK PURGE
WASH BIAS
COLD BLOW 0
RADIAL WASH 0
UPPER WASH 0
LOWER WASH 0
MAIN EXTRACT 0
EXT LVL SWITCH
HD TANK LEVEL
342 GPM FV 20 26 %
37 62 % 268 GPM
WASH 0.68
FV1 2A 1550 64.9 %
HV9 0A
HV 81
FV1 2B -5.0 %
4.5
HV9 0B
FV 87 415
BLOWLINE VIBRATION -0.4
BLOWLINE AVERAGE 148.5
2AD INLET TEMP 160.8
BLOW FLOW TO 2AD
BL PROD 922.4 ADMT
PROD RATE 0
OR <
BL HIGH TEMP 161 DEG F AUTO
BL CONS 9.5 % AUTO

Results

- Simple operator interface;
- Sustainable increase in production of 50 admtpd;
  - from 900admtpd to 950admtpd;
  - Unlock blow line flow from 1600 to 1800usgpm
- No more (almost) bypass around double atmospheric diffuser due to high temperature;
- Get the heat out of digester wash zone;
- Stable blow line consistency;
- Reduction of Kappa # variability by ~50%;
  - from 10-12%COV to 5-6%COV;
- Digester stability;
- On time, on budget!

Acknowledgement

Skookumchuck Pulp Inc, Skookumchuck BC

- Mark Cameron, Process Specialist
- Ian Dougall / Don Deynon, Pulp Mill Superintendent
- Chris Brown, Senior Digester Operator

TEXO Consulting & Controls Inc., Gatineau QC

- Mario Leclerc, VP APC Development & Deployment