

Mill Wide Intelligence Delivered to Higher Management

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Agenda

- Who we are
- Architecture & Challenges
- Performance & Monitoring
- Results & Benefits
- Conclusion & Future Plan

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ADITYA BIRLA GROUP

Fortune 500 company

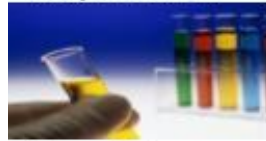
\$41 B conglomerate

120,000 employees

42 different nationalities
across the world



Acrylic Fibres



Chemicals



Metals



Telecom



Agri Business



Financial Services



Mining



Textiles & Apparels



Carbon Black



Insulators



Pulp & Fibre



Trading



Cement



IT / ITES



Retail

Who We Are

- Globally

- The world's largest aluminum rolling company.
- World's No.1 in viscose staple fibre.
- Biggest producer of primary aluminum in Asia.
- The No.1 producer of carbon black in the world.
- Fourth-largest producer of insulators in the world.
- Fifth-largest producer of acrylic fibre in the world.
- Among the best energy efficient fertiliser plants.

- India

- A premier branded garments player.
- Second largest player in viscose filament yarn.
- Second largest in Chlor – alkali sector.
- Second largest producer of cement.
- Among India's top 4 BPO companies.
- Among the top five mobile telephony players.
- A leading player in Life Insurance.
- Among the top three super-market chains in the retail business.

Australia | Austria | Bangladesh | Brazil | Canada | China | Dubai | Egypt | France | Germany | Hungary | India | Indonesia | Italy | Ivory Coast | Korea | Japan | Laos | Luxembourg | Malaysia | Myanmar | Philippines | Poland | Russia | Singapore | South Africa | Spain | Sri Lanka | Sweden | Switzerland | Tanzania | Thailand | Turkey | UAE | UK | USA | Vietnam

About AV Terrace Bay

- Located on the shores of Lake Superior, AVTB is a NBSK pulp mill producing over 330,000 tonnes annually.
- 360+ Employees, \$151 Mn invested over last 3 years
- Part of Aditya Birla Group



Mill History

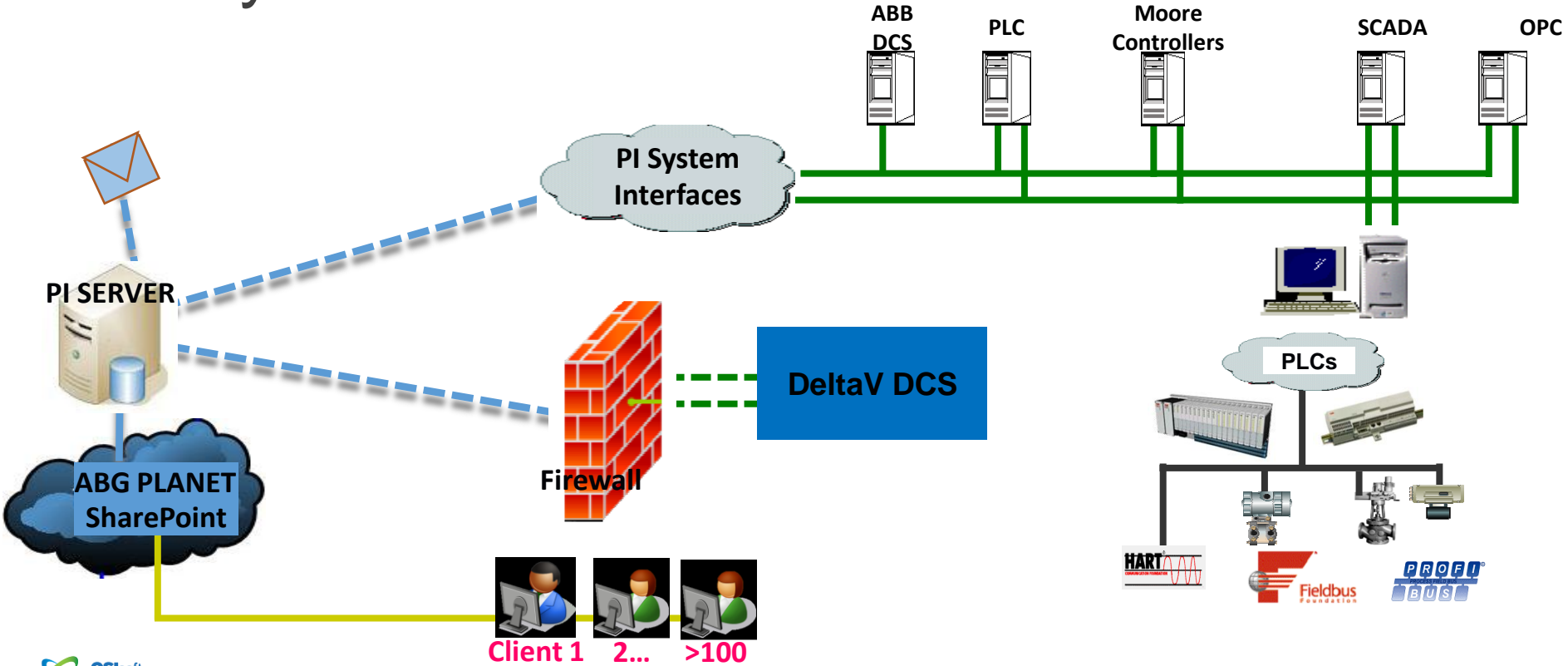
- Built and started production in the year 1948
- Modernized in 1970s and 1990s
- DCS Upgradation is in process – expected to complete in 2020



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PI System Architecture



Challenges

- Very Old Control Systems (eg. Stand alone Moore Controllers & ABB Infi90 Systems)
- Partial Implementation of DCS System
- Lack of Mill wide Monitoring System
- Production Losses
- Unplanned Outages

Moore Controller Integration

The big challenge we had when started doing our phase 1 project is integration of moore controller with PI System, due to following reasons

- Controllers are stand alone. SO have to interact with PI System using independent computer interface(ICI)
- Around 400 controllers all over the plant
- Different generation of Moor Controllers(351,352E,352P,353)
- There is Moore ICI which can interact and PI System interface
- But each ICI can interact with max 32 controller

Moore Controller Integration

- Installed one ICI for every 32 controllers and made physical loop connecting each controller link card
- Gave unique link station address to each controller to identify from PI System interface
- Configured the required process parameters in each controller to put out on the link
- Installed PI System interface for each ICI and connected ICI with interface with serial (RS-232)
- Configured each PI Tag manually by using station address configure on each controller

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AVTB SharePoint Portal – Landing Page

V Terrace Bay

BROWSE PAGE PUBLISH

ADITYA BIRLA AV TERRACE BAY

Home Conference Rooms Real Time Dashboard Business Units Common Information Plant Systems PI Vision EDIT LINKS

Search this page

Home

- FPY and Uptime Charts
- Environment
- Hot Water
- Mill Status
- Pulp Mill
- Steam Plant
- Chemical Trend Display
- AVTB Reports
- Mill Overview Process Par
- Wood Room
- Bleach
- Pulp Machine Overview
- R8
- Screening
- Blow Heat
- Digesters
- Hot Water Accumulator
- Steam Header Overview Dig
- Stripper
- Cleaner System
- Daily Totalizer
- Knotter & BSW

Enviro Water Top

Enviro Water Top SubTitle

LEARN MORE

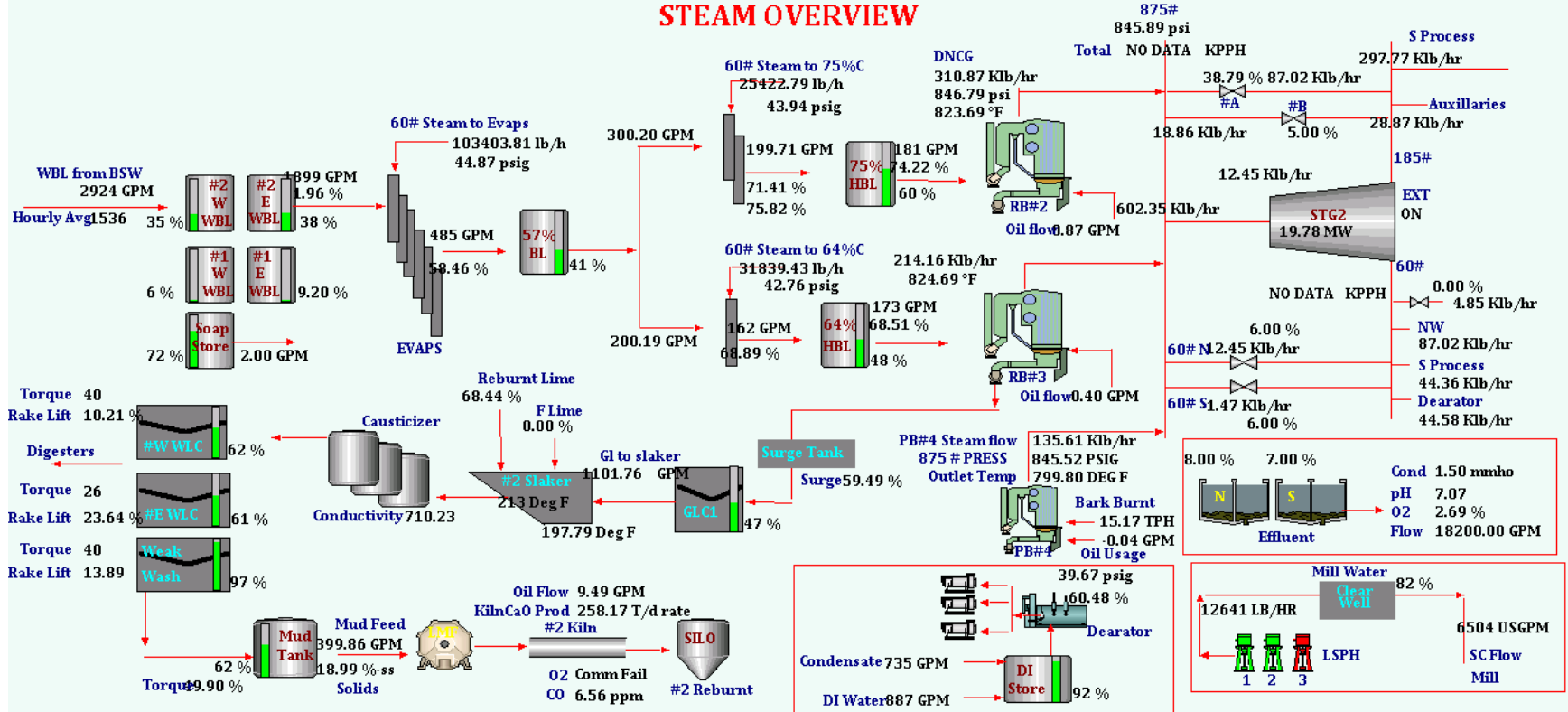
Production Details

Production(ADMT)		Prod. Avg.(ADMT)		Quality (%)	
Running	73	Running	--	Running	100
Previous Day	1108	Previous Day	1108	Previous Day	100
MTD	2173	MTD	1086	MTD	100.00
YTD	2173	YTD	1086	YTD	100.00

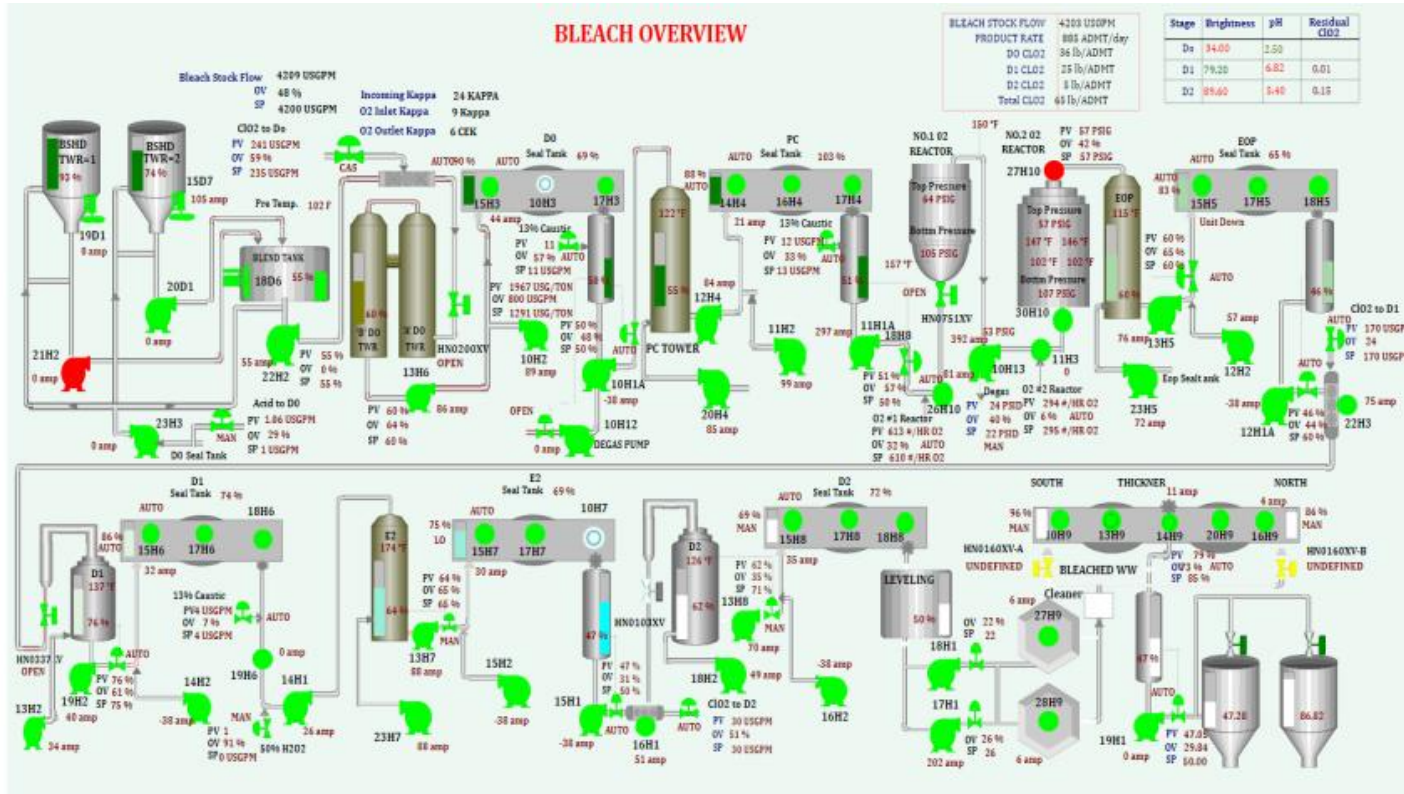
NEWS, EVENTS & ANNOUNCEMENTS

Mill Overview Screens

STEAM OVERVIEW



Mill Overview Screens



Mill Overview Screens

Mill Status

No. 1 Weak Black Level	West / East	68 % / 66 %	
No. 2 Weak Black Level	West / East	71 % / 74 %	
Evaporator Flow	Feed	2349 GPM	
57% / 64% / 75% Storage Tank	Level	38 % / 71 % / 68 %	
	No.2 Recovery	No.3 Recovery	No.4 Power Boiler
Steaming Rate	300.64 Klb/hr	305.30 Klb/hr	122.24 KPPH
Liquor Flow	200 GPM	227 GPM	14.03 TPH
New Hopper Deck speed			44.00 %
Bark 1Hr Avg			17.07 TON
Oil	-0.07	0.41	-0.06 GPM
South process Steam			358 Klb/hr
#2Dig / Bleach / #3MC	KPH	176	0 / 128
Clarifier North / South	Torque	11 %	7 %
Chipping Rate	m3/Hr	452.29	m3/Hr
Surge Bin Level	%	82.00	%
Environment			
1 DO / 2 DO / Outlet DO	(mg/L)		
Stripper(Steam/C in /C out)		9 %	774 μS 296 μS
HWA Cond	ALK Cond(μS/cm) 1538	TRS	
ASB	ALK pH 9.7	ASB TRS (ppb) 9.84	
Outlet pH	ALK Flow (gpm) 9039	Clarifier TRS (ppb) 0.56	
Outlet Cond (mS/cm)	Acid Sewer (gpm) 5133	Wind Speed 7.30	
Outlet Flow (gpm) 14300	Wetwell pH	Wind Direction 72.51	
Mix Ch Inlet pH (a)	NSS Cond(μS/cm)	St Martins Stn (ppb)	
Mix Ch Inlet pH (b)	SSS Cond(μS/cm)	Terrace Hts Stn (ppb)	
BOD Analyzer(mg/L) 374	Turp sewer(μS/cm) 6	RSH Caustic Flow(gpm) 6.64	
Lime slurry to - (gpm) -1	K2 NCG / K2 SOG	50% RSH Caustic Tank LVI 42 %	
		50% RSH Caustic Flow 1 GPM	

No 2 RB Precipitators				No 3 RB Precipitators			
2B	10.70 amp	1B	8.70 amp	1C	94.00 mA	2C	3.60 KV
2A	149.00 mA	1A	94.00 mA	1B	3.60 KV	2B	3.60 KV
2A	38.60 kV	1A	3.60 KV	1A	3.60 KV	2A	3.60 KV
				Scrapper		Scrapper	

Turbine Generator	MW	20.27 MW
875# Steam Pressure	PSI	825.97 psi
Power Drawn from Grid	MW	18.55 MW
Green liquor Clarifier	Level	60 %
White Liquor Storage	West / East	1 % / 67 %
Lime Mud Storage	Level	77 %
Mud Filter	Feed Flow	462 GPM
Recaust Rate	Flow Rate	938 GPM
Brown Stock HD / Bleach Hi Density	#1 / #2	68 % / 53 % 79 % / 97 %
ClO2 Storage Tank	#1 / #2	81 % / 82 %
Digester EAW / EA/LW Ratio	% / lb/R3	16.20 / 6.07 / 4.17
KAPPA Brown / Bleach Inlet / PC/EO		28.5 / 23.20 / 10.6 / 5.24
Brown Stock	Flow (GPM) / ADMT/D	7333 / 1145
Bleach Plant	Flow(GPM) / ADMT/D	5401 / 1148
ClO2 / NaClO3 #/# of Clo2	TPD / lb/ADMT	28.39 / 59 / 1.85
185# Header Pressure	PSI	177.52
Pulp Machine / Stock flow/OD / ADMT	FPM / GPM / % / TPD	461 / 7206 / / / 1137
Bright/Dirt	% / %	89.00 / 0.51
Dance Roll Position(Wet/DRY)	% / %	45.25 / 45.11
Total Mill Water Flow	1 2 3	15011 GPM / 73 % / 17 PSI
Makeup(WW/Blch/MC/BSW/HWA)	%	31 / 100 / -3 / 30 / -3

	UOM	Running	Previous Day	MTD	YTD
Production	ADMT	76	1108	2173	2173
Production Avg.	ADMT		1108	1086	1086
Quality	%	100	100	100.00	100.00

Daily Report



Report Viewer - Daily Steam Report

DAILY STEAM OPERATING REPORT

Days	Shift 1	Shift Engineer
Night	Shift 2	Shift Engineer

Safety	
Number of Green Card	0
Number of Fire Permit Pickup	0

2 RECOVERY BOILER

	Value	KLB/Hr	UOM
Steam	4137	172	kLB/day
FW	4662	194	kLB/day
Steam/FW Rate	88.73		%
DNCG on	23.05		Hrs
Scrubber Caustic			MT
Reduction Eff.			%
GL TTA			LB/RT3

	Day	Night	Totals	UOM
Bunker-C	1341	5926	7268	USG/Shift/Day
	1117	4934	6051	IG/Shift
	3.27	12.00	15.27	Hrs
75% HBL	197	158	177	GPM
75% HBL Solid	72.79	72.60	72.70	%
	1.14	0.89	2.33	MLB/Shift
Steam by HBL	96.61	85.05	81.67	%
Steam Gen by HBL	2.52	0.4	1.27	Steam LB/BL LB

WBL from BSW
WBL to Evaps
57% BL from E
57%BL to 64C
64%HBL from
57%BL to 75C
75%HBL from

#3 RECOVERY BOILER

	Hr	UOM
Steam	5513	230 kLB/day
FW	6219	259 kLB/day

	Day	Night	Totals	UOM
Bunker-C	1	2475	2476	USG/Shift/Day
	0	2061	2061	IG/Shift

CHEMICAL REPORT

Section 1-Raw Data Entry from Bleach & R8 Printouts

PRODUCTION (LINKED)	ADMT	
Bleach Operating Time - determine from Bleach Log downtime comments		
CAUSTIC to No. 2 Bleach	USG	47596.25
ACID to #2 Bleach	USG	-1202.37
OXYGEN	Lbs	-1458048
HYDROGEN PEROXIDE	USG	-3596.59
CHLORINE DIOXIDE	USG	0
ACID TO R8	USG	5346.71
METHANOL TO R8	USG	1641.56
CAUSTIC TO R8	USG	6334.4
CHLORATE from mass flow meter	Lbs	129803.75

Section 2-Linked Data from R8 Log

SODIUM HYDROXIDE SOLUTION (LINKED)	g/l	160
CHLORINE DIOXIDE (LINKED)	g/l	10.24

Section 3-Data for SAP Production (262)

CHLORINE DIOXIDE	lb	77726.79
TURPENTINE	IG	0

Section 4-Data for SAP Consumption (261)

CONIFER CHIPS,SPECIES-SPRUCE (LINKED)	m3	0
SODIUM HYDROXIDE SOLUTION	lb	63553.48
SULPHURIC ACID 93% CORRECTED	lb	-18360.26
OXYGEN	lb	-24300.8
HYDROGEN PEROXIDE,50/70%	lb	-18147.33
CHLORINE DIOXIDE	lb	0

Asset Framework – Loaded 120 + P & IDs

The screenshot displays an industrial asset management software interface. On the left, a tree view under 'Elements' shows a hierarchy: Elements > AVTB > Pulp Mill > R8(CHEM. PREPARATION) > 51-6-010 MTPD R8 Process CLO2 Plant Conversion > Steam Plant > Evaporator Mill > 43-6-001 Double Effect Concentrator > Pumps > M-13740 CIRCULATION PUMP. The main window shows the 'M-13740 CIRCULATION PUMP' details. A table lists attributes with an orange circle highlighting the first three rows: Attribute1 (0), Description (C1 Circulation Pump), and Name (<not set>). The right panel shows configuration options for the selected asset.

Name	Value	Time Stamp
Attribute1	0	1/1/1970 12:00:00 AM
Description	C1 Circulation Pump	1/1/1970 12:00:00 AM
Name	<not set>	1/1/1970 12:00:00 AM
OperatingMode	AUTO	9/19/2017 1:03:36.344 PM
PIDno	43-6-001 Double Effect Concentrator	1/1/1970 12:00:00 AM
Pump Running Load	99.2891235351563 A	9/21/2017 8:43:18.975 AM
Running Status	RUNNING	9/19/2017 1:10:30.33 PM

Information from P&IDs

PI System Integration –Startup / Shutdown Checklist

Checklist Selector

Plant Or Process

Sub Process

Checklist Type

Start New Check List

Submit Check List

Previous ProcessBook

Next ProcessBook

Pre Startup1

- Methanol dilution water FIC-HN831
- Chlorate feed FIC-HN543
- Acid feed FIC-HN542
- Reboiler steam FIC-HN544
- Generator process air FIC-HN551
- Chilled water to absorption tower FIC-HN571
- Chilled water to vent scrubber FIC-HN590
- Salt cake dissolving water FIC-HN907
- 13% caustic solution FIC-HN911

Pre Startup2

- Set CLO2 Absorption Tower to 42%
- salt cake tank level to 70%

Check Water Purges

- Generator Pressure FN553
- Slurry Pressure HN890

Check Air Purges

- Generator pressure HN553 PT PIC <200
- Filter Vacuum HN606 PT PI >25
- CLO2 Absorption tower Level HN575 LT LIC >25
- Open water valve at back of ICC on 4th floor

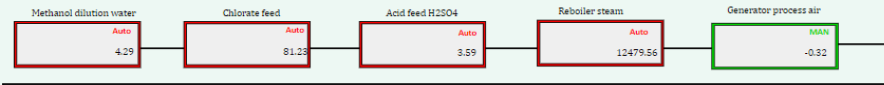
PI Graphic

Checklist Start Time 4/9/2018 5:08:21 AM
Process Time 00:00:23

R8 Start-Up Checklist Stage 1

Following Controllers Need To Be In Manual With Zero Flow On Same

Pre Startup Stage 1



Pre Startup Stage 2

CLO2 Absorption Tower To 42%
Actual: 39.42 %
Estimated: 42.00 %

Salt cake tank level To 70%
Actual: 69.80 %
Estimated: 70.00 %

Check Water/Purge

Generator Pressure
Actual: 119.32
Estimated: 120.00

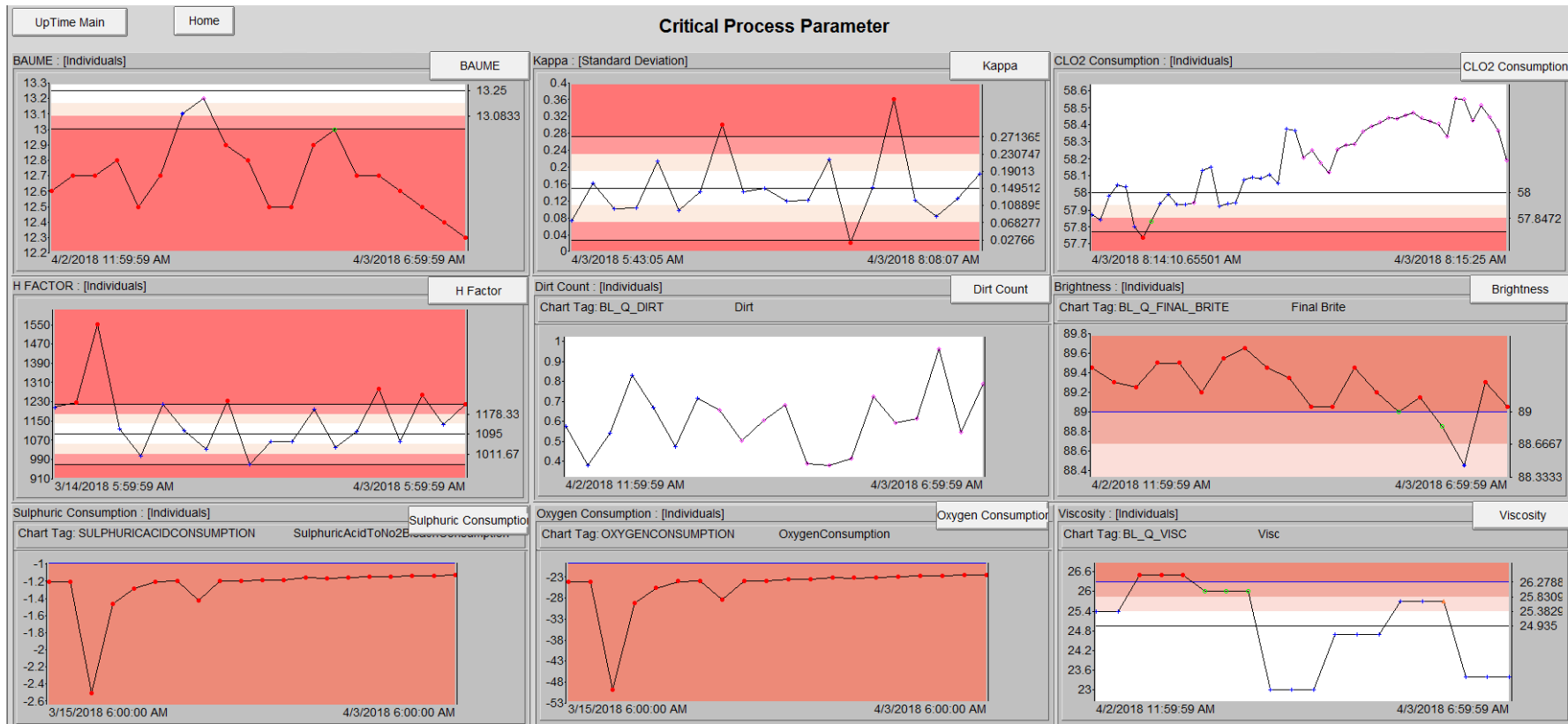
Slurry Pressure
Actual: 17.96
Estimated: 18.00

Completion Status

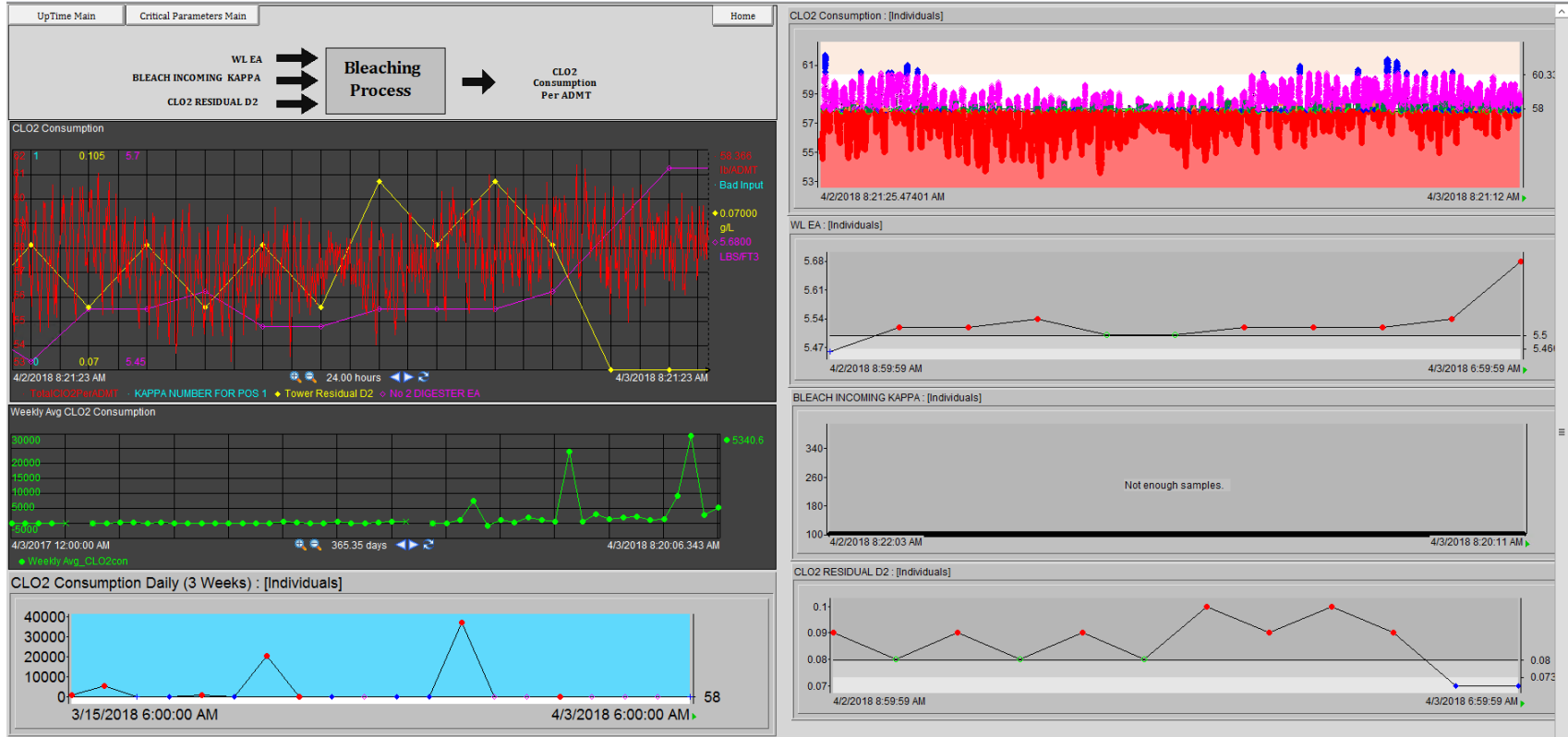
Real time calculations and condition checks
using AF Analyses

- ❖ Operator Performance
- ❖ Benchmarking

PI SQC – Comparing Inputs – Outputs for Critical Parameters



PI SQC – Comparing Inputs – Outputs for Critical Parameters



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Challenges to SI

1. Integration and interface with hundreds of very old Moore controllers
 2. No existing Asset Register
 3. It was mandatory to utilize SharePoint as a central portal to view all real time data, reports , manual entries and data from external quality systems
- PI System integration done for the below :
 - ABB Infi90 DCS System
 - Delta V DCS
 - Moore Controllers (Native PI to Moore ICI Interface last updated in 2004 by OSIsoft)
 - Pulp Machine Drives (Allen Bradley PLCs)
 - Ekhosoft Data (Operator Logbooks)
 - Loaded PI AF with tons of data from 120+ P&IDs for future condition based maintenance (CBM)
 - About 30+ PI ProcessBook screens developed for visualizing almost all parts of the Plant
 - AVTB Portal using SharePoint as single entry point for company wide viewing
 - Steam Report & Chemical Report using SSRS/ SharePoint and PI System Access
 - E-mail Notifications deployed for user defined rules

Results & Benefits

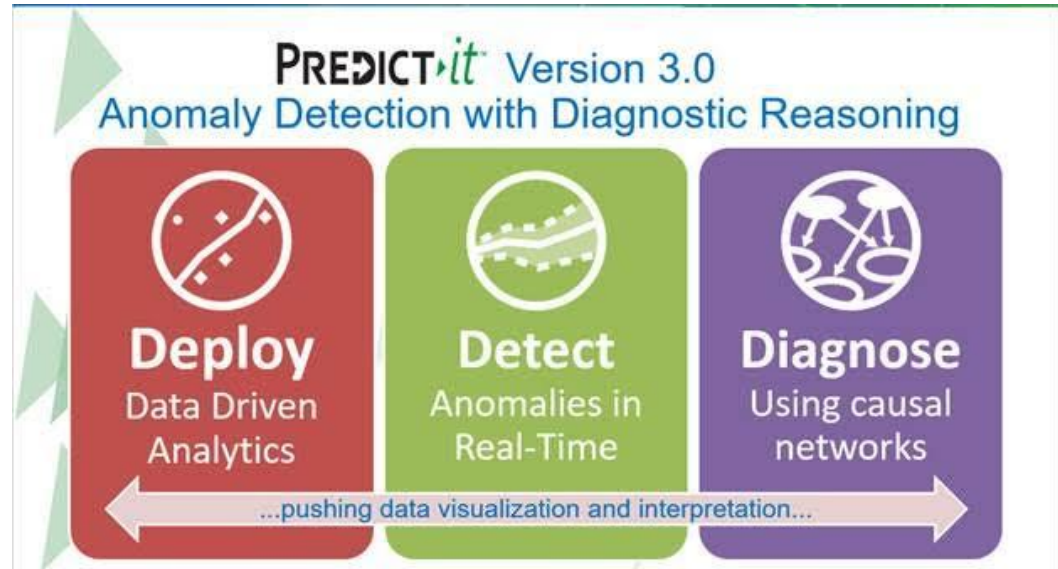
- For the first time in so many years the Mill becomes **PROFITABLE !**
- Reduced downtime & improved efficiency due to **Mill Wide View** to engineers and senior management
- **Energy savings to the order of 15%** due to visibility of peak demand rates
- Automating of steam & chemical reports **reduced man hours** needed in compiling them
- PI System perceived as a **single source of truth** across the plant

Agenda

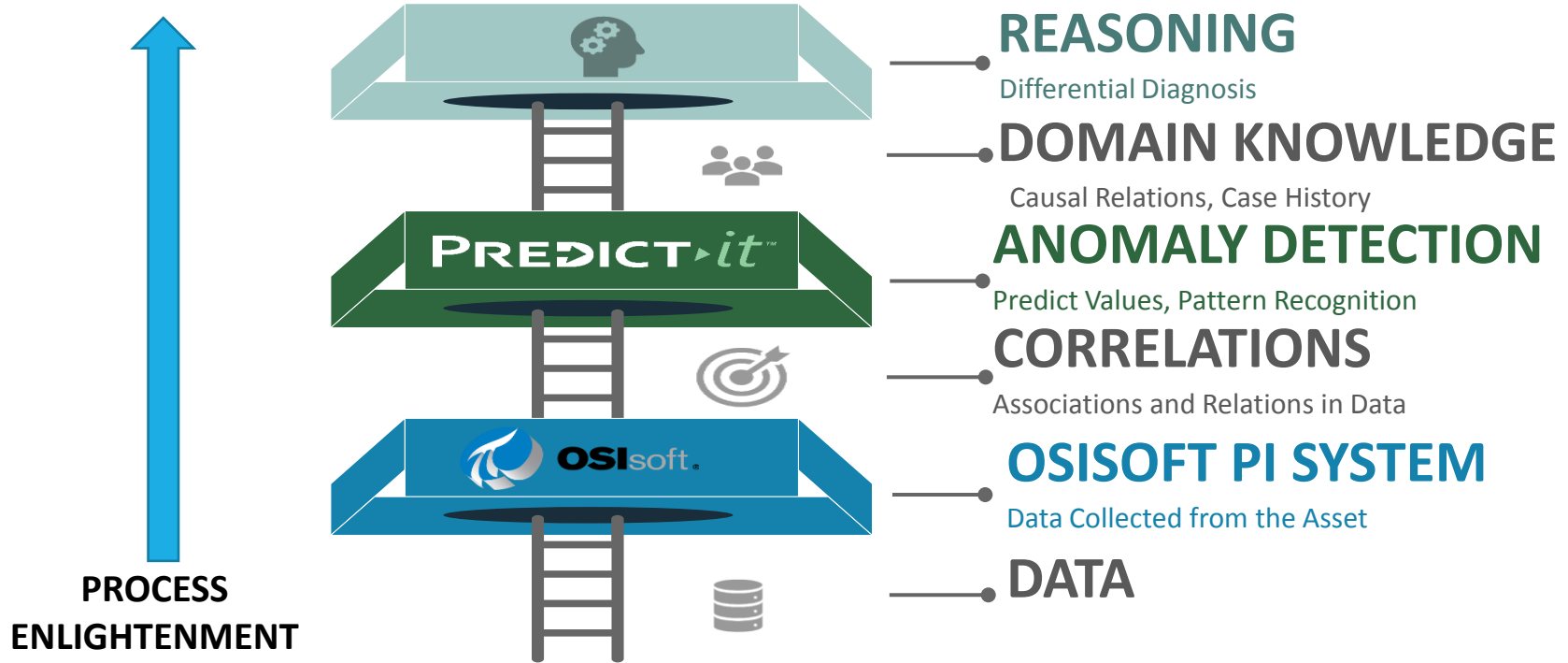
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Conclusion & Future Plan

- Predictive Analytics
- IIoT via wireless sensors
- SAP/ERP integration
- Move to Latest OSIsoft products and releases



Predict-It can help build patterns from more than just the historical data !



Presenters



- **Abhinav Korrapati**
- Abhinav.korrapati@adityabirla.com
- E&I Project Engineer
- AV Terrace Bay



- **Limesh Misal**
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- ECGIT

Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

Please remember to...

Complete the Online Survey
for this session

UPDATED VERSION
COMING SOON

Merci

谢谢

Спасибо

Danke

Gracias

Thank You

감사합니다

ありがとう

Grazie

Obrigado

PI System helped AVTB to overcome issue which led to profits